

The Industrial Worker in Ontario



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TO THE REGISTRAR,
THE UNIVERSITY OF TORONTO.

We beg to report that the thesis of Mr. W. H. Rutherford on "The Industrial Worker in Ontario," together with his discussions of the questions set on the History of Philosophy and Ethics, the Principles of Psychology and Ethics, the Science of Education, and the History and Criticism of Educational Systems, qualify him for the degree of Doctor of Pedagogy.

(Signed) H. T. J. COLEMAN
W. E. MACPHERSON
W. PAKENHAM
PETER SANDIFORD

TO THE SENATE,
THE UNIVERSITY OF TORONTO.

Gentlemen:—

I hereby certify that the thesis above mentioned has been accepted for the degree of Doctor of Pedagogy and that Mr. Rutherford has complied with all the regulations in accordance with the statute in that behalf.

Signed

JAMES BREBNER,
Registrar.

The Industrial Worker in Ontario



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Chapter I.

THE TWO REQUIREMENTS OF INDUSTRIAL TRAINING

To become a thoroughly efficient mechanic, a man must acquire not only manual skill, but also mental ability to apply his craft to any changing conditions that may arise. In his training two aspects must be considered, the practical and the information side. Many people do not regard the information side as important. They say, "If you want a boy to be a mechanic, put him in the shop; give him the tools, and let him stick at the job until he can turn out the required article." Many of the so-called mechanics of to-day have been made in that way. They have developed by force of habit, a series of muscular actions that will put a certain surface on a board, or that will bend a piece of steel. But we may ask, are these men all that they might be as mechanics? Are they equipped to meet any unusual conditions in their work? Are they in a position to suggest better ways and means of obtaining a required product? Let us consider a few definite cases.

The steel expert at one of our large manufacturing establishments made an analysis of a certain shipment of steel, and found that it contained a very much larger percentage of sulphur than was specified. He showed further that such steel, if made into the machines for which it was intended, would not give satisfaction. As a result of his investigation, the whole shipment was returned, and to avoid similar mishaps, workmen were instructed in the constituents of steel, so that they are now able to detect defects.

Again, the Psychological Department at one of our universities, required some forty iron plates for experimental purposes. In each plate a hole was to be drilled in such a way that while the diameters of the holes increased by the smallest possible gradations, the distance from the edge of the hole to the edge of the plate was to be constant. The professors in the department were convinced that such a series of plates could be made, but they were unable to tell how to take the tools and do it. A practical mechanic who was approached on the subject, declared that the plates could not be made. He had never met with a similar problem, and he had not enough theoretical knowledge to believe that it could be solved. However, when a theorist and the practical man joined forces, the plates were made as required.

As a third example, a Toronto firm which manufactures agricultural implements, received complaints from many customers because the teeth of their rakes were splitting. It was not until an expert was put to work on this problem, that the cause was discovered. The molten steel, when cooling in the ingot, sank in the centre. Not enough was cut off this end to get below the lowest point in the depression, and as a result, when the steel was rolled into the small rake tooth, the flaw extended for a much longer distance.

The value of expert knowledge was still further emphasized by the experience of a Toronto machine shop. The workers were using an excessive number of dies, so the management had an expert investigate the cause. He suspected that the lubricant, which was oil, was responsible for the waste, and, by making a study of lubricants, discovered that when lard was substituted for oil, the wear on the dies was reduced by 100%.

Our last example will be drawn from the farm. A farm some thirty miles from Toronto had been giving poor returns for some years. A young man who had taken a course at the Guelph Agricultural College bought the farm, and the neighbors at once prophesied failure. However, this man had made a study of soils and the constituents necessary to produce different kinds of crops. He at once began to treat the land with the constituents he had found lacking, with the result that he has now one of the most productive farms in the district.

Illustrations might be multiplied, but we have given cases where a theoretical knowledge of the materials involved did actually overcome a difficulty which the man with practical training only, was unable to surmount. We claim, therefore, that for a proper knowledge of any of the industrial operations, the information side and the practical side must be correlated.

A man with both the theoretical and the practical knowledge, cannot be produced in the shops. Many elements of modern day industry preclude this. The small shop of earlier days, where the apprentice worked and lived with his "boss," has given place to the mammoth factory. The proprietor of the small shop had personally gone through all the stages of the work. The apprentice had an opportunity of seeing and being drilled in the different operations in their proper order. The mechanic, however, is no longer trained in this way. Now that machinery has taken such an important place in modern industries, and each part of a given product is made by a separate machine, the ordinary workman gains a very limited and circumscribed acquaintance with the details of the manufacture in which he is engaged. All he is asked to do is to handle some one machine from which

he passes the product on to the next man, who in turn runs it through his machine, and so on. Moreover, under present conditions, a foreman is not going to take up his time in showing an apprentice how the work is done. The modern employer would soon object to the entry on his foreman's time sheet—one-half hour showing John Smith the "why" of his work. The factory in consequence dwarfs the man. It makes him a hand, and that in a sense most discouraging. This continuous work with a part of a part is most monotonous. He never gains insight into the whole of a finished product. There is no joy in his work. It is not creative.

These two facts, then—that information and practice should be correlated, and that this correlation is impossible in the modern shop—are our basis for concluding that some kind of school is necessary to train workers in the various industries.

You ask, "Will this institution turn out mere tradesmen—carpenters, plumbers, etc.?" We say, "Yes, they will be carpenters, plumbers, etc., but in a new sense of the term." Not only will they be able to ply their respective trades efficiently, but they will also be familiar with the theory, and with the possibilities of their tools. A new situation will not put them entirely at a loss, but rather give an added interest to the work as the problem unfolds under the light of their theoretical knowledge. Not only will great advantage accrue to the industries from the ability to solve new problems, but both the quality and the quantity of the work will improve.

However an artisan trained in the theory as well as in the practice of his trade, will not of necessity be an ideal citizen. He is in no sense equipped for the rational use of his time outside the shop, and, in fact, not fully equipped for his time in the shop. We must not forget that as well as facts, there are principles—principles of government; principles of morals; principles of statesmanship. Shall our future citizen be permitted to pick up his ideas of citizenship by chance? Will he regard it as his object in life, to gratify ambition, commercial and political, or will it be his aim to exercise a trust which has been given him for the advancement of the happiness of the human race? Economists teach us that manual skill was one of the chief advantages derived from subdivision of labor. Machinery, however, coupled with the enormous motive power in the natural resources of our country, transferred industrial power from manual skill to capital. Machinery, while demanding increased skill and intelligence from the relatively few, has lowered the standard of the relatively many. And the more narrow and restricted the worker's experience is in factory and shop, the greater is the need of broadening

his interests in the class room. The great aggregations of labor, their sharing of industrial power, and their profound influence on the future of society, add new importance to the need of general education. Further, the great advance in education, "the leisure wrung from toil," with the increased opportunities it offers, and the growing interest of the working classes in the unsolved problems of themselves and their relation to others, demand a wider education than that required for mere efficiency in one's occupation. It is becoming more clearly recognized that technical and general education are not mutually exclusive, but complementary, and that the best education for the citizen will be found in a well-balanced proportion of education for livelihood and education for life.

Dr. Kerschensteiner says: "An education devoted exclusively to technical training for an occupation, is not worth much as a preparation for citizenship. It is quite as likely to encourage selfishness as to encourage altruism. The school which devotes not a single moment of the day to any other interest than that of personal gain or the desire to become an expert worker in order to gain an advantage over competitors, is hardly a suitable nursery of civic virtues."



Chapter II.

A PERIOD OF UNIVERSAL EDUCATION

The following data from "Education for Industrial Purposes" by Dr. Seath, show the great need for some revival of education in our own Province: "Out of an estimated total population of 2,687,861, there were enrolled in the public schools 401,268, and in the separate schools 55,034. As to secondary schools—lower schools, 24,599; middle schools, 11,567; upper schools, 2,801. Accordingly in the secondary schools 13,032 fewer attend the middle school than the lower school, and 8,766 fewer the upper school than the middle school; and of a total of 456,302 enrolled in our public and separate schools, only 2,801 reach the highest classes."

The question might properly be asked, Why do so few go on? We think that the answer is that the ordinary type of school has long held a position aloof from the rest of the world. Its methods and ideals were nurtured in that monastic atmosphere from which the business world was religiously excluded. The clatter and clang of the factory were not regarded as conducive to the cultivation of lofty ideals. The less the teacher knew about them the better. Why should he descend to this mundane sphere? The classics, their history and interpretation were all that interested him. If a student could not be persuaded to concentrate his mind on the aesthetic side of his make-up, then he did not deserve an education. Let him remain a "hewer of wood and a drawer of water." As a result of this attitude sons and daughters of artisans do attend our high schools in great numbers, but with doubtful results. Will the carpenter's son take his father's place at the bench on leaving the high school? If not, how will the trade be carried on? Has his education been a blessing to the community? In a word, how will the world's work be done if education educates boys and girls out of the manual occupations?

In the main, our educational system may be said to date from the time of the renaissance. In earlier days, when justice was "the interest of the stronger," the common man was rated with the cattle as the spoils of victory. Education was confined almost entirely to the monks in the cloister, and even there it was regarded as something of a separation from the world. With the revival of learning, however, a great impetus was given to education. The fruits of industry became the property of him who earned them. The common man saw extended before him a wide vista of opportunity, and the natural thing for him to do

was to seek the blessings of learning. He soon found that the education suited to the monastery was not suited to him. The courses designed for law and medicine, for example, in no sense served his needs. However, as this scholastic education was the only form known, many of the so-called common people entered these schools. As a result, the learned professions were overloaded with students bound to make failures, simply because they were not adapted to the work. Moreover, the industries in which these men had formerly worked sustained a double loss. Not only were the most ambitious lost to the industries, but the culture and training which would otherwise have been added to the industries was also transferred. The common man—and we wish here to state that common man in this paper will not mean a man of inferior clay, but common in the sense that there are many of him—went at the question with his customary directness and reasoned that just as the learned professions had courses adapted to their needs, so there should be other courses with matter and method adapted to the needs of the industries. Can there not be a system of education where not only the practice and theory of particular work are learned, but where also culture and grace become an integral part of the industries?

The demand for such a system has been ever rising, until today we have in operation an educational renaissance with vocational education as the pivotal point. In the following chapter we will give a brief sketch of what is being done in some of the more important countries of the world to meet this demand for industrial training.

Chapter III.

OUTLINE OF SOME OF THE MORE IMPORTANT SYSTEMS

GERMANY.

At the base of the German educational edifice lie the Volk-schulen, or common schools. Attendance is compulsory between the ages of seven and fourteen. These schools are divided into three kinds—lower, middle and higher. This division is, in the main, on a social basis. The parents decide what course they wish their child to pursue when he reaches nine or ten years of age. If primary, he continues in the Volkshule. If secondary, he leaves the Volkshule and enters one of the secondary institutions, of which again there are three classes—the Gymnasium, Real-gymnasium, or Ober-Realschule, with a nine years' course; Progymnasium, Realprogymnasium or Realschule, with a six years' course; trade or technical schools of secondary rank. Those who decide on a primary education continue in the Volkshule until fourteen years of age, and then go out to work at one of the trades. For this class of pupils, the continuation school is the avenue for further education. This school takes two forms—a general continuation school and an industrial continuation school. The former continues the work of the Volkshule along general lines, whereas the latter has a distinct industrial trend. The German continuation school originated in the Sunday continuation schools which date back as far as 1569. Originally its main purpose was to strengthen and deepen the religious knowledge of the children and therefore instruction in the catechism was the chief feature. In some states—Württemberg and Bavaria for example—instruction was compulsory up to the sixteenth year.

It was in Saxony in 1835 that the modern development of the industrial continuation school began. Awakened by the industrial power of England, town councils and trade associations started a vigorous movement for the establishment of these industrial continuation schools. Each year saw some new law tending to make these schools compulsory and forcing employers to allow their workmen, under eighteen years of age, to attend them.

Dr. Kerschensteiner, Director of Schools of Munich, has been a pioneer in the movement to harmonize the moral and religious, the vocational and civic points of view in these schools. In his

prize essay published in 1902 on "Training of Youth for Citizenship During the Years Between Fourteen and Twenty," he laid down the principles which in his opinion should govern a properly equipped continuation school. His plan is now in force, not only in Munich, but in many other centres of Germany. In these schools the future occupation of the pupil is made the pivotal point, and instruction in drawing, mathematics, civics, etc., is directly connected with the vocation. These schools are divided into three groups—industrial, commercial and agricultural. They are managed and supported by guilds, by associations of workmen, by manufacturers and by communities. The tendency is becoming greater every year to have the state make substantial contributions and take a decided part in the management.

The lower technical schools, whose course extends over one and a half years, attempt the education of the middle and lower officials, the foremen of the great industries and the managers of independent plants in the handicrafts or small industries. These schools are able to prepare for higher work in the case of students who have either a better general education or longer practical experience, or who can return to school after additional workshop practice. The requirements for admission are: (1) The general education of the elementary schools; (2) training of the continuation school, especially in drawing and arithmetic; (3) several years' practical experience in a trade and, at least, the completion of apprenticeship. While theoretical instruction is considerably developed in these schools, yet the workshop takes a foremost place on the programme.

The middle technical schools rank between the lower technical schools just discussed and the higher engineering schools and technical high schools. In 1910 these schools supplied 68% of the engineers employed by 105 of the most prominent German manufacturers. The need for these schools may be seen from the fact that entrance into the technical high school calls for graduation from a gymnasium or real gymnasium or some equivalent, so that the graduate of the German technical high school has probably attained his twenty-fourth year. At this age the right time for practical experience has passed. To avoid this, the middle technical school was organized to provide a quicker and sufficiently adequate training for young machinists and technologists in the middle branches of industry. If they went to the lower technical schools, their standard would be raised above that which would most effectively minister to the wants of the lower ranks of trade. If, on the other hand, they went to the technical high schools, it would endanger the position of these schools as leaders among the technological institutions of the world. The instruc-

tion is scientific, and includes lectures, class work and practice. Supplementary practical experience is given the pupil regularly in places where work shops or business experience exists. Requirements for admission are not uniform, but usually attendance at one of the six year schools is demanded. The regular course is for two and a half years.

The trade schools of Germany might be classed as secondary schools. In them, we see how well the Germans prepare their workers for the separate trades. Most of these schools might be classified according to their work, as building trades schools, machine trades schools, art trades schools, textile schools, agricultural schools.

There are about fifty building trades schools in Germany, most of them with two departments—architecture and civil engineering. In the latter department are included courses for civil engineering, road, street and railway building, hydraulic engineering, and bridge construction. The Prussian Ministry states officially that the purpose of these schools is to prepare: (1) for the building trades skilled laborers who intend to become independent contractors, masons, etc.; (2) draftsmen and designers, as well as building foremen for architecture and civil engineering; (3) officials employed in government, military, railroad and city buildings, or civil engineering for provincial, county and communal administration. The work in these schools is divided into five grades, each requiring half a year. This is so arranged that students leaving before the full course is finished may still have some definite part of the work.

There are two grades of machine trades schools in Prussia. The higher is a secondary school requiring greater academic preparation and a longer course of study than the other, and preparing for higher positions in the industries. There is also a wide difference in the character of the instruction offered in these schools. Students come to the higher school with less practice (two years in a shop), but with better academic preparation; students come to the lower with more practice (four years in a shop), but less theory. As a result, the lower school turns its attention more to the practical side, while the higher can develop the work more from a scientific standpoint. The course for the higher school is five half-year semesters, and that of the lower, four. The higher schools provide for the instruction of engineers, inspectors and draftsmen. The lower school is intended for lower technical inspectors, overseers and foremen. Both of these schools include departments for evening and Sunday work for persons who cannot give their full time to the school.

The crown of the industrial educational system of Germany, is the technical high schools referred to previously. Their fame is world-wide, for students from all parts gather in their laboratories, and go forth to fill important places in the scientific world. Their mission is pre-eminently to enrich commerce and industry, to produce things convenient and comfortable, and to create security for life and property. These schools are practically great scientific universities. At the present time there are eleven such institutions in Germany, the largest being in Berlin, located in the suburb, Charlottenburg. This school is organized in five departments—architecture, civil engineering, mechanical engineering and electrical engineering, naval architecture and naval engineering, chemistry and metallurgy. As entrance requirements, completion of one of the nine-year courses is necessary for a German student, and for a foreigner attendance at some institution which is considered an equivalent.

The art trades schools are at present divided into four groups: (1) industrial continuation schools for the art trades; (2) schools for handicrafts; (3) schools for industrial art and handicrafts; (4) industrial art schools. In each case they endeavour to adapt their programme of study to the peculiar industrial conditions of the locality, and offer opportunity for instruction in all kinds of skilled labour in all branches of the art trade. All these schools have work shops in connection with them. They make an effort to have the art grow out of the industry, so that a knowledge of the practical work and of drawing is required.

An important part of the work done by these schools is done by evening and Sunday instruction. In this latter class, the instruction is all for the trades.

(1) and (2) are chiefly evening schools; (4) chiefly day schools. Pupils for (1) and (2) must be at least fifteen years of age and have passed the elementary school; pupils for (3) and (4) must have gone through either (1) or (2).

Art schools are further divided into two principal sections—the preparatory school and the special. The former aims at imparting the measure of artistic and technical knowledge necessary for the successful prosecution of studies in the latter.

The textile industry in Germany is more dependent upon foreign markets than is any other industry. The German people saw that skill in this work was essential, and, as a result, they provided a very complete system of textile schools. The higher textile schools are intended to train the manufacturers and the directors of textile concerns. The lower schools are intended to develop the work master or artisans of the trade. One produces the skilled supervisor and the other the skilled hand.

Many of the higher textile schools are organized in four departments—spinning, weaving, dyeing and finishing; spinning, weaving and finishing in half year courses and dyeing in a year course.

With respect to agriculture, statistics show that there are about twenty-five theoretical farmers' schools in Germany. The course of instruction in these schools usually consists of three classes which correspond to the three upper classes of a *Realschule*, usually with a three-class preparatory school in connection. There are also a number of forestry continuation schools of lower rank than the above, which have the same general aim as that of the industrial continuation schools.

There are about two hundred agricultural winter schools where it is possible for young sons of peasants to acquire a theoretical training without taking time from the summer's work. In addition, numerous agricultural courses are given to train teachers for the agricultural continuation schools.

Industrial education for girls has received relatively little attention from the Germans. The largest institution is the "*Letzte Verein*" in Berlin with over three thousand students. It includes a commercial school with a two years' course and a so-called industrial school with courses in handicrafts, machine sewing, tailoring, and kindred subjects. An employment bureau is maintained to assist women in securing positions. There are also a number of private schools which train women for the industries.

Another type of school is the housekeeping school which is intended for girls from the working classes who have been compelled on leaving the elementary school to enter practical life without an opportunity of acquiring the knowledge or skill needed in ordinary housekeeping. In some cases, industrial and commercial classes are combined with these schools.

Owing to Germany's desire to train for every industry, there are many special schools that are not included in the preceding summary, and in fact we have referred merely to the main unit in their system.

FRANCE.

Technical Instruction in France might be classified as follows: (1) Primary technical instruction, which is given in apprenticeship schools and in the higher primary schools; (2) secondary technical—as, for example, the instruction given in the schools of arts and trades; (3) superior technical, of which a type is the instruction given in the Central School of Arts and Manufactures, and in institutions of the same high order.

As Paris led in making provision for primary technical education at public expense, the schools of this city have formed models for the rest of France. We must note, however, that the Paris technical schools, of which there are now fifteen (seven for boys and eight for girls), have a standard both in achievement and equipment only possible in a large manufacturing centre. Further we might note that, while nominally the Paris schools are included in the state system of public instruction, they are in reality under the control of the municipality. In Paris a child enters the infant school at about three years of age, and the primary school at six. Here begins a regular course of manual training, which, in the case of boys, is generally conducted in a school workshop, and in the case of girls, comprises sewing and the cutting of garments, millinery, and other feminine industries. At about 12 years of age, when a certificate of primary studies is gained, the pupil is eligible for admission to either a higher primary or an *école professionnelle*.

Of these higher primary schools, the *École Diderot* might be mentioned first. It is a school mainly for iron workers. It has for its express object the making of well-instructed and skilful workmen, capable of earning their living on leaving the school. The instruction is both theoretical and practical. The pupils enter school at 7.45 a.m. and leave at 6 p.m., with but two intermissions, viz., 12-1.15 and 3.15-3.30. The school year runs from September first to July thirty-first. This school is pre-eminently a school of apprenticeship. The general instruction occupies such a secondary place that it is reduced to the lowest limit in order to allow the pupils to spend as much time as possible in the workshop.

Next we might mention the *École Estienne* (for the book-binding and printing trades), which is probably more famous than the *École Diderot*. Some particulars from the official regulations will indicate the place of these schools. "The course lasts four years. The theoretical instruction has for its object the completion of the general instruction of the apprentice, including those indispensable ideas which should be possessed by every workman who desires to excel at his craft. The principal subjects of the theoretical course are: (1) French; (2) history and geography; (3) mathematics; (4) physical and natural sciences as applied to the industries; (5) history of art; (6) history of the industries; (7) industrial drawing; (8) gymnastics and military exercises."

From the nature of the specialties of this school, its theoretical course is much more extended and cultural than that of the *École Diderot*. In each branch there is an examination at the end of

each four months. Those who do not receive sufficient marks either repeat the work or are dismissed from the school, at the discretion of a superintending council. Each pupil receives a book in which are entered his marks both for studies and conduct. It is handed over to him every Saturday evening, and must be returned on Monday morning signed by his parents or guardians.

The remaining technical schools of Paris are: The École de Physique et de Chimie; The École Bernard Palissy, which is a school of fine art applied to industry; Germain Pilon, a school of practical drawing; the École Boulle, distinguished for furniture and cabinet making; and the École Dorian, a municipal orphanage which gives extended training in iron and wood work. The courses in these schools, as in the two more fully described, cover three or four years.

The eight municipal technical schools for girls in Paris are devoted to trades for women, such as tailoring, millinery, flower making, fine lingerie, etc. The courses are necessarily much less varied than in the case of schools for boys. In these schools decorative drawing and design form an essential part of the art work. On the practical side, training is given in the manipulation of the materials, such as tapestries, lace, ivory, leather, etc. which enter into the final product.

Next in order in group one, we might mention the national technical schools, which are state supported, and contain in each school three departments—infant school, primary school, and specialized technical school. Candidates for admission to the industrial section must have secured certificates from the primary department. The programme for the first year is the same for all schools of this class, but in the second year specialization begins, the work thenceforth bearing directly on the industries of the locality. For example, at Vierzon, it is related to iron work and painting on pottery; at Voiron, to working in paper, linen and silk; at Armentieres, to iron work and weaving.

A fourth class of schools in this group is the practical schools of industry. They are maintained by the united effort of the government and the municipality in which the schools are situated. The course is a three-year one, and the major part of the time in all years is devoted to workshop practice. Correlated with this practice are French, history, geography, mathematics and science. All these subjects, however, receive about one-third of the time devoted to shop work. In the corresponding school for girls, the programme gives more time to general instruction than in the boys' school.

The great majority of art and trade schools in France, which constitute the second group, were founded by Chambers of Com-

merce, trade syndicates, and private individuals. The chief features which distinguish them from group one are: (1) their origin and social support; (2) their greater specialization; (3) the greater age of their pupils, most of whom are working at a trade; (4) the absence of entrance requirements. The purpose of such schools is to perfect workmen in their craft. The instruction is usually free, and this is significant when we take into account that the manufacturers, trade unions and employers of labour maintain them.

The national schools of arts and trades are situated at Paris, Aix, Angers, Châlons-sur-Marne, Lille and Cluny. These schools are highly specialized and have elaborate equipment for workshop practice. Each of the schools accommodates about three hundred pupils and has a course covering three years. The students remain in residence in all cases. Each of these schools is assigned a certain number of departments of study, and they aim to turn out managers and foremen in these separate branches. They have a great prestige in France. Not only are they ranked as government institutions, but they have the power to exempt from two years' military service their graduates who obtain 65% on their final examinations.

In the third group is included the École Centrale des Arts et Manufactures, Conservatoire National des Arts et Métiers, École des Hautes Études Commerciales, Institut Commercial, École Supérieure de Navigation. These schools are all situated in Paris, and offer the highest grade of scientific and technical instruction in France. They are intended to prepare men for the technical service of the state or for becoming directors of large enterprises. These schools are under different ministers, namely, the Minister of War, the Minister of Agriculture, etc., according to the character of the instruction.

In this third group, we might also class the department for scientific research and experimentation in each of the different universities. For example, at the University of Marseilles there is a chair of industrial physics and another of industrial chemistry. There are similar chairs at Bordeaux and Nancy. At the University of Lille there is a chair of applied chemistry, and at Lyons a chair of agriculture.

The system of agricultural education in France is well organized in elementary schools and in normal schools. Also many higher primary and secondary schools include a special section for agriculture. Apart from the foregoing, which is an integral branch of the general education, France is well supplied with special schools of agriculture. These schools are models of organization, equipment and method.

Closely akin to this work is the movement for the uplift of rural life in France. In this connection, university professors unite with the teachers of more elementary schools, and support is given by both the Government and the Commune. Courses of instruction, illustrated lectures, dramatic representations, social reunions, and circulating libraries are all brought to the service of the cause. Through the efforts of these university professors, the latest discoveries and the best scientific knowledge bearing upon agricultural processes are brought to the attention of the farmer.

ENGLAND.

England was probably the last among the older countries of the world to adopt a systematic plan of training the workers in her industries. Public concern as to industrial competition, which was excited by the exhibitions of 1851 and 1862, and intensified by the severe depression of trade in 1884-6, may, without hesitation, be regarded as the source from which the Technical Education movement of the last twenty-five years derived its main strength. The Science and Art Department, though established a few years earlier as a department of the Board of Trade, was in reality the product of the first exhibition referred to. The City and Guilds of London Institute was established in 1878. To it we owe the great engineering College of South Kensington, the Finsbury Technical College, and some minor institutions. The Technical Instruction Act of 1889 empowered local authorities (county and town councils) to supply technical education out of the rates. The rate was not to exceed one penny in the pound. In 1890, certain customs and excise duties were distributed to local authorities to aid the above. The Act of 1902 made it incumbent on the county councils to take such steps as were necessary for educational needs and to promote the general co-ordination of all forms of education. Since the passing of the 1902 Act, Technical Education has depended almost entirely on local initiative.

In respect to principal administrative features and the general operation of the system of public education, London is a type of all English cities. The education committee, the local managers, inspectors, etc., are repeated in every town and county. The educational expenditure is met in all these places by government grant and local taxes in about the same proportion. This being the case, we will speak in some detail of the system in London, and afterwards will make some reference to such cities as Manchester, Liverpool and Birmingham.

Owing to the great part played by the Polytechnic schools in London, we might mention them first. The Polytechnic, in name

at least, is a school peculiar to London. It provided one of the earliest forms of technical training. While other schools for technical instruction are under the control of the council, these schools are under private management. Every disposition is shown by the managers of the Polytechnics to co-operate with the council, which in its turn fosters their work by grants of public money. The work of these schools is determined largely by the needs of the locality served. A few examples might be given. The oldest institution of this type is the Regent Street Polytechnic. The main work in this institution centres around the building and engineering trades, for which, in addition to evening classes, there are day schools intended to give a training to boys who have been through a secondary school course and who intend to enter upon professional work at about eighteen or nineteen years of age. In the Battersea Polytechnic, technical chemistry and engineering are strongly developed. One of the most important sections is a training college for teachers of domestic economy. This is the largest in Britain. The Borough Polytechnic is the home of the trade class, and its evening work is concentrated on teaching the ordinary artisan, in trades as various as confectionery and bootmaking, the scientific principles and practice of his trade. In the day there is a school for boys which serves as a preparation for apprenticeship at the age of sixteen or seventeen, and a trade school for girls, preparing them to enter the needle trade and laundry work. Most of these schools have also a strong social side, with libraries, gymnasiums, etc. According to the report of the London County Council, there were in 1912, 34,476 students attending schools of polytechnic rank. The Polytechnics differ very much in the grade of work done. Some do not attempt any work of an advanced stage, while others take work right up to and including university grade.

London has also a number of monotchnic institutions where some one department is developed. The school of building at Brixton is an example.

With respect to the rest of the schools, we might divide them into day schools and evening schools.

Day Schools.—In this connection we might first speak of two groups which may for convenience be called secondary technical and primary technical. The former presupposes an education of a more or less secondary type, and has a minimum age limit of sixteen years. The most successful school of this type is the Engineering School at the Northampton Polytechnic. The course is a four-year one, of which the first year and half the second are spent in the institute. During the six summer months of the second year, the students go out into workshops where they work

under commercial conditions. The third year is spent, half in the institute and half in the shop. The fourth year is spent entirely in the institute. Similar schools exist at Regent Street Polytechnic, at Battersea Polytechnic, and at the Southwestern Polytechnic.

The primary technical school takes boys at the age of thirteen and gives them a pre-apprenticeship training, sending them out at from sixteen to seventeen into trade workshops as apprentice improvers. The day school at Shoreditch may be taken as typical. Taking the course as a whole, we may say that half the time is devoted to general education and half to technical, much stress being laid upon general education during the earlier part of the course and upon technical during the latter. The school at Shoreditch prepares boys to enter the furniture and wood-working trades.

Trade Schools for Boys.—During the past ten years a type of technical school new to London has come into existence, namely, the Day Trade School. These trade schools are designed to take boys on completion of their elementary school career for a period of one, two, or three years, and to give them a specialized training, which will fit them to enter, about the age of sixteen, workshop or factory life. It is not their object to turn out trained workers, but rather trained learners. The curriculum is also designed to carry on the general education of the pupil as well as to give him specialized technical training. It is usual to devote an increasing amount of time to trade subjects in the second and third years of the course. The report of the Council for 1912 reports 897 boys in this type of school.

Trade School for Girls.—There are at present six day trade schools for girls in London, providing classes in dressmaking, designing, embroidery, millinery, upholstery, laundry and cookery. The course has been fixed at two years. Parents who wish to enter their girls are required to undertake that they shall stay the full course and pursue the trade at its completion. The school hours are divided roughly in the proportion of two-thirds time to trade work and one-third to general school subjects and art work. Each school has an Old Girls' Association, and an effort is made to keep in touch with the girls when they leave the institution.

Schools of domestic economy for girls were established as early as 1893, and their purpose is to train, not for domestic service nor for any special industry, but for home-making. There are now eleven of these schools in the London County area. Of these, three are conducted in London County Council Technical Institutes, and eight in Polytechnics and aided institutions. These schools give one year's course of training in domestic art to girls leaving the elementary schools.

Day Classes For Apprentices.—Another field of day work is the holding of day classes for apprentices in the ordinary workshop hours. Some examples are the following: Apprentices at the London & Southwestern Railway Works take morning classes in the Battersea Polytechnic; apprentices from the Royal Arsenal take classes at the Woolwich Polytechnic; apprentices from the Midland Railway Company attend the Northern Polytechnic. The Gas, Light & Coke Company send their apprentice gasfitters to Westminster Technical Institute.

Evening Schools.—The evening schools directly under the London County Council meet from the third week in September until Easter. There are three kinds of evening schools—(1) science and art and commercial centres; (2) ordinary evening schools; (3) schools for the deaf.

In the commercial centres, the instruction is of a more advanced character than that given in the ordinary schools and includes accountancy, banking and currency, civil service subjects, economics, English literature, shorthand and typewriting.

The subjects in the ordinary evening schools include:

(1) General—reading, writing and arithmetic, elementary science, drawing, citizenship, vocal and instrumental music.

(2) Literary and commercial—English literature, modern languages, geography and history, correspondence, bookkeeping and shorthand.

(3) Art—model, freehand and geometrical drawing, wood carving.

(4) Manual Instruction—wood work and metal work.

(5) Domestic Subjects—cookery, dressmaking, nursing, needle work, physical exercises, drill, gymnastics.

The ordinary evening schools may be roughly divided into two classes: (1) Those with a commercial basis, which constitute the great majority and are mostly mixed schools; (2) those with an industrial or domestic basis in which the sexes are generally taught separately.

With respect to the first type, they differ from the commercial centres previously referred to, in having a wider range of subjects, which includes dressmaking, millinery, and those studies in the preliminary trade courses. Regarding the schools with an industrial or domestic basis, they are as a rule situated in poor neighborhoods. Lads engaged in unskilled labor and factory girls form the bulk of the students. The course includes preliminary practical wood work, work shop drawing, reading, writing, arithmetic, gymnastics, and first aid. There are more students in attendance at these so-called ordinary evening schools than all the other forms of evening schools put together. The following

figures are from the report of the London County Council for 1910-11: in polytechnics, 25,000; in maintained technical institutes and schools of art, 10,000; in commercial centres, 30,000; in ordinary evening schools, 100,000.

Another type of school which has advanced education beyond the elementary school is the higher elementary schools. Their aim is more vocational than formerly, as the report of the London County Council for 1909 shows. It says, "The 22 schools of this class in London have been withdrawn from the grant in view of the fact that after prolonged negotiations with the Board of Education, it is unable to obtain any substantial concessions on various fundamental questions regarding curriculum. The Council has agreed that as an experiment, a specially-approved curriculum should be put into operation in certain existing departments. These schools are vocational in character, using the word as it is now current in educational discussions."

Manchester, which under the régime of the school boards led the country in the establishment of higher grade schools, has recently organized six higher elementary or "Central" schools of the new type.

Manchester has made excellent provision for technical education. The Municipal School of Technology represents the highest form of instruction offered. It has day and evening departments, the total number of individual students amounting to 5,299, of whom about 300 attend the full week-day classes. The Municipal School of Art has also day and evening classes. There are evening schools conducted by the Education Committee in addition to those mentioned above, these being divided into three groups: Grade 1—evening continuation schools; Grade 2—branch technical schools, branch commercial schools, and evening schools of domestic economy; Grade 3—municipal evening school of commerce, central evening school of domestic economy and teachers' and special classes.

Technical instruction in Leeds ranges from the general evening continuation schools up to the University of Leeds. The first grade is taken in the general evening school; the second, in the various Mechanics' Institutes and branch artisan schools; the third, comprising the central technical school, the Cockburn technical school, and the West Leeds technical school, while the fourth grade is taken in the University of Leeds.

Liverpool does similar work in her municipal technical school, evening continuation schools, central technical school, and day preparatory trade schools.

The aid given by universities to technical education is of great and growing importance. The University of London, the Univer-

sities of Birmingham, Manchester and Cambridge, Armstrong College at Newcastle-on-Tyne, and the University Colleges at Nottingham, Reading and Southampton are among the more important having technological departments. In this class might be placed the Central Technical College of the City and Guilds of London Institute, which was established for the purpose of providing the highest grade of engineering education. The Royal School of Mines connected with the Royal College of Science, is a similar institution, providing the highest instruction for mining engineers.

Textile schools for day students providing a full course of advanced instruction, are found at Bradford, Huddersfield, Halifax, Bolton, and in other parts of Yorkshire and Lancashire.

Art Schools.—England has for many years been interested in art education. As early as 1836, a government grant was made towards the opening of public galleries and the establishment of a school of design. The Department of Science and Art, which later gave place to the Board of Education, did much to advance the teaching of art. London is well supplied with schools for this work. We might first mention the Royal College of Art, which is primarily intended for the training of Art Masters and Mistresses. The scheme for instruction in art under the London County Council is quite extensive in its scope. In both elementary and secondary schools, it occupies a prominent place on the curriculum. There are also a number of schools, devoted exclusively to art, typical cases being the Central School of Art and Crafts, Southampton Row, the Royal Female School of Art at Queen Square, and the School of Photo Engraving and Photography, Fleet Street. Other cities are equally well equipped in this department.

Agricultural education in England is well advanced. The following summary from the 1910 report of the Board of Education might give an idea of what is being done: (1) Evening continuation schools for lads of fourteen to seventeen who have completed their day school education at a public elementary school. (2) Local classes for young farmers which meet every day for a period of from two to six years, or in the evenings for two hours weekly throughout the winter. (3) Longer continuous courses for young farmers, lasting from two to six months, held at the County Agriculture Institutes. (4) Series of from four to six lectures by the county staff instructors in special subjects, such as manures, feeding stuffs, grasses and clovers, first aid to farm animals. (5) Agricultural Colleges, serving as a rule more than one county area. (6) Classes, with competitions in manual processes of the farm, such as plowing, hedging, thatching and sheep herding. (7)

Local demonstrations by the county staff in pruning, grafting, spraying, and in methods of combating plant pests and diseases. While no one locality can boast of all of the above forms of education, yet it is an ideal towards which the Board is striving.

SCOTLAND.

Excellent provision is made in Scotland for continuing education after the elementary schools. This provision, as far as rural districts are concerned, has, so far, taken the form almost entirely of evening classes. For the conduct of these classes, the Scottish Education Department has drawn up a special code, and by the Educational Act of 1908 school boards are required to provide such classes. They have also power to make the attendance at these schools compulsory.

The courses of study for continuation classes throughout Scotland are arranged in four divisions, of which the first is for completion of general elementary education. Of the remainder, two are specialized courses, either theoretical or strictly trade and technical, such as bookbinding, electrical engineering, etc. The fourth course comprises subjects of varied character; for example, dressmaking, military drill, and repoussé work.

In the large towns, such as Glasgow, Edinburgh, Dundee and Aberdeen, the school boards have an elaborate system of evening classes, which are directly affiliated with the evening classes held in the Central Technical institutions, such as The Glasgow and West of Scotland Technical College, The Heriot-Watt College of Edinburgh, Robert Gordon's Technical College of Aberdeen, and the Technical Institute of Dundee. Courses of study have been drawn up in the evening continuation classes held by the school board, by which the students obtain a course lasting over two or three years, and thereafter qualified pupils pass on to the more advanced instruction which is provided by the central institutions.

With respect to day schools, these central technical institutions (sixteen in number) have in the majority of cases day departments. The Heriot-Watt College, the West of Scotland Technical College, the Technical Institute, the Edinburgh College of Art, the Glasgow School of Art, the Glasgow Athenaeum Commercial College, the Leith Nautical College, the Edinburgh School of Cookery and Domestic Economy, and the Royal Dick Veterinary College, are samples of these so-called central institutions. Some of these institutions are of university rank. The first two, for example, are strong engineering and chemistry schools.

Agriculture.—Naturally, technical and trade courses have been most highly developed, both in the continuation classes and in the central institutions, but agriculture is engaging more and

more attention. There are three Agricultural Colleges—at Edinburgh, Glasgow and Aberdeen, which are classed as Central Institutions. Schemes recently formed for the extension of the work of the agricultural colleges include the appointment of a college organizer for each county or group of counties comprised in the college area. Among these, are dairy and poultry instructresses, and in the case of the crofting districts comprised in the area of the Aberdeen college, special crofter instructors have been appointed. The formation of local advisory committees to assist the staffs of the colleges in the organization of the extension work is a feature of the scheme.

IRELAND.

All forms of education in Ireland have received a stimulus in recent years from the efforts of the Department of Agriculture and Technical Instruction. Its influence on the elementary school is seen in the increasing number of schools offering instruction bearing on the common industries of the day. The 1912 report of this department shows an expenditure of some \$650,000, which is divided among nine schools of rural domestic economy for girls, forty county instructors and the Albert Agricultural College at Gasnevin. Referring more specifically to technical training, we might add that this department began its work by establishing summer courses for training teachers in the sciences that underlie the industrial arts. Classes in drawing and manual work for teachers followed. Subsequently, the department developed schemes for instruction and plans for the organization of technical and industrial classes for young people, in combination with local agencies. The work spread until nearly all the secondary schools of Ireland have adopted the department programme of experimental science and drawing. The final stage in this development is marked by the establishment of municipal technical schools which are aided by grants from the Department.

UNITED STATES.

It is difficult to make any definite classification of the schools in the United States which offer training for the industries. Some schools might be classed as trade schools from one standpoint, and as the very opposite from another. The Bureau of Education at Washington makes the following classification in the 1910 report: Schools which provide—(1) Complete trade training, in which the effort is made to graduate finished mechanics or skilled workers capable of doing journeyman's work or earning journeyman's wages. (2) Intermediate or pre-apprentice trade-training

in which it is sought to shorten the period of apprenticeship or to give skill and intelligence preparatory to an industrial occupation. (3) Industrial improvement or supplemental instruction for those already engaged in industrial pursuits.

Some schools provide all three of these courses, and some only two. Out of the 142 schools listed as offering training for the industries (for whites), eight schools offer training in all—The California School of Mechanical Art, San Francisco; Eric Pape School of Art, Boston; Ohio Mechanics Institute, Cincinnati; Carnegie Technical Institute, Pittsburgh; and Pratt Institute, Brooklyn, are some examples. Of the remainder, thirty-eight give training in two of the above. Among the largest of these are—Armour Institute of Technology, Chicago (2 and 3); Evening Schools of Trades, Springfield (2 and 3); Worcester School of Trades (1 and 3); Hoboken Evening School (2 and 3); New York Trade School (2 and 3); and Drexel Institute (1 and 3).

Trades schools proper are of comparatively recent origin. The first, the New York Trade School, was founded on private endowment in 1881. During the next twenty years only two important schools which trained in the mechanical trades were founded. These were The Williamson Free School of Mechanical Trades, near Philadelphia, and The Baron de Hersch Trade School, New York. Out of the 142 schools previously referred to, only ten are listed as confining their attention to group one, but some thirty give specific training in the trades as well as instruction classified under groups two and three. A typical trade school is the Milwaukee School of Trades, Wisconsin. It provides instruction in pottery making, machinery and tool making, carpentry and joinery, plumbing and gas fitting. Provision is also promised for any trade when a sufficient number present themselves to form a class. To qualify for admission the student must be sixteen years of age and be able to read and write English and perform the fundamental operations of arithmetic. The evening classes supplement the experience of apprentices and workmen who are employed during the day.

With regard to the second type—intermediate or pre-apprentice trade training—a great many have been established in the last few years. They have been introduced as part of the public school system in Rochester, Albany, and New York, and in six other cities in New York State; also in Newton, New Bedford, and other Massachusetts cities. These schools aim to take the boys and girls from fourteen to sixteen, and present such a training as will give a sound basis of general principles and a wide acquaintance with materials and processes. They do not aim at a special trade training, but rather at the fundamentals of trade groups, which will be of aid to the boy or girl on entering the industry.

These schools place great emphasis on practical work under commercial conditions. The academic work is made to depend on the particular industry or industries of the locality. A study of the list of schools, in the report referred to above, shows that a majority of the 142 give training of this kind.

The general admission requirement is a graduation diploma from an elementary school, but pupils who have not this diploma may be admitted under special conditions. The course is either for one or two years. Help is given along the line of vocational guidance by allowing boys to take up several lines of trade at first, and later to specialize when he makes a choice. The Albany Vocational School, The Worcester Independent Industrial School, and the Rochester Shop Schools are given by Dr. Seath in his Report on Industrial Education as types of this school.

There are a number of different schools which may be put in group three, as offering industrial improvement courses to workers already engaged in industrial pursuits. One class of the above is apprentice schools in shops. A large number of manufacturing and railroad companies, in order to increase the efficiency of their employees or to train up a generation of workers, have instituted schools in which their apprentices are taught such subjects as mechanical drawing, shop arithmetic, strength of materials, mechanics, electricity, testing of machines, etc. The detailed arrangements differ from shop to shop, but in general the teaching is very practical and is intimately connected with the shop work. The apprentices are usually paid for their time while in the shop, and are held to the same standards of attendance and discipline as the regular workers. Some companies conduct the schools largely to provide future foremen, designers, superintendents, and technical experts. The popularity of these apprenticeships is attested by the fact that in the better companies there are many candidates on the waiting list. Some of the companies which have adopted systems of this sort, are (with number of hours of schooling a week given), The Fore River Ship Building Company (eighteen hours for seven months); The New York Central lines (four hours); The Santa-Fé Railroad (four hours); The Westinghouse Electric and Manufacturing Company, of Pittsburgh (four hours); The International Harvester Company, of Chicago (seven hours); The General Electric Company, West Lynn, Mass. (seven and a half hours).

Akin to this last named type is the part-time system or co-operation between school and shop. In this type the employers and school or schools divide the time of the apprentices according to different proportions, the bulk of the time usually being spent in the shops. The instruction given is technical, relating to shop work. The following are typical cases. In Beverly,

Mass., the apprentices of the United Shoe Machinery Company alternate in two groups of twenty-five each, between the Beverley Industrial School and the shop. The boys are paid half the regular pay for their work. In Fitchburg, Mass., apprentices in mechanical trades are given one full year in the High School, followed by three years of alternate weeks in the shops of manufacturers as apprentices, and in schools. In Cincinnati, Ohio, apprentices are taught in an improvement or continuation school of that city for four hours a week, during forty-eight weeks of the year. The school teaches shop mathematics, the three R's, civics, mechanical drawing, blue-print reading and good citizenship.

As a sample of co-operation in higher branches, the plan in operation between the University of Cincinnati and the manufacturers of that city might be cited. Engineering students, who are accepted by the manufacturer, are enrolled also in the University, and regularly indentured for a six-year course, in which shop and school are closely co-ordinated. During the college term they spend alternate weeks in shop and school, and when college is closed they work regularly in the shop. They are paid for their work in the shops at rates which total about \$2,000 for the six years.

According to government statistics,* there are thirty high schools in which instruction with a vocational aim is offered. Some of these are on the co-operative plan last dealt with, the school at Fitchburg being an example we used. If, however, we seek to group them in one of the classes mentioned at the outset, the large majority would find a place in the second class, in which the vocation is made the pivot and the other subjects are grouped around it. In some schools, the Stuyvesant High School of New York City, for example, the industrial course is simply one of the courses offered. This school provides general courses preparatory to medicine, law, dentistry, and pharmacy.

It is scarcely necessary to give a separate treatment of industrial training for girls as the same three groups exist. Many of the schools referred to above have, in each of the three groups, separate departments for girls. In these they are taught a trade, the various activities pertaining to the household, and the aesthetic subjects, depending on the type of school. Many separate schools for girls are in operation, some well-known examples being, the Worcester Trade School, The Manhattan Trade School, The Boston Trade School, The Boston Girls' High School of Practical Art, and The Hebrew Technical School for Girls, New York.

* Part I., Report of Bureau of Education, 1910. page 253.

The Bureau of Education makes a separate grouping of vocational schools for negroes, and also another for Indian schools. It points out that with respect to the training of negroes, the schools are primarily academic and cultural in aim, and consequently it was not possible to group them according to one of the three classes given. It adds that many efficient workmen graduate from the industrial departments of these schools. There are fifty-three schools of this type. With respect to the Indian schools, they are for the most part non-reservation boarding schools and offer instruction of a more advanced grade than that of the reservation schools. Generally the effort is not made to graduate finished skilled workers.

The majority of the schools in all the above classes have evening departments, and they reach by far the largest number of individuals under instruction in the field. Some states are agitating for a transfer of these evening continuation classes to day classes, as is the movement in Germany, but have not made much headway along this line.

The correspondence schools of the United States reach a great number of students, both in their own country and in Canada. Many students who are unable to attend school have been helped to better positions by these courses.

There are a number of institutions which offer technical training of university grade. Some examples are: Sheffield Scientific School of Yale University; the Lawrence Scientific School of Harvard University; the Chandler School of Science of Dartmouth College; the School of Mines at Columbia; the John C. Green School of Science at Princeton; the Massachusetts Institute of Technology at Boston; and the Leigh University at South Bethlehem.

Agricultural Education—Agriculture is taught in sixty-seven institutions in the United States. Of these so-called agricultural colleges, only one, Massachusetts Agricultural College, is devoted exclusively to Agriculture; twenty-three are colleges of Agriculture and Mechanics Art; and twenty-six are colleges or departments of universities. All of these institutions give courses that are designed to prepare the boy for successful competition in one or more of the various lines of commercial agriculture. Ten of the agricultural colleges have courses specially designed for training teachers in agriculture, and twenty-three have courses in psychology and general education. Forty-three institutions have directors of agricultural extension work. All these institutions receive appropriations from the State in amounts varying from a few hundred dollars to fifty thousand dollars.

In their efforts to reach the largest possible number, their activities have been conducted along wide lines, such as giving

lectures, publishing and distributing bulletins, conducting correspondence courses and reading courses, founding travelling libraries and movable schools, instituting educational trams, demonstration farms, educational exhibits at fairs and other places, moving pictures, etc. More than twenty-four million copies of bulletins and circulars are issued annually by the state experiment stations and the Department of Agriculture.

According to Government report,* there were in 1912 two thousand high schools teaching agriculture. Of this number about three hundred and sixty were giving courses of two or more years. This list includes forty-six state schools of agriculture, forty district schools and sixty-two county schools.

Farmers' Institutes constitute an important part of this work. In 1912 there were 16,000 sessions held. Every problem that confronts the farmer or that has to do with rural life finds a place on the institute's programme.

Rural Women's Clubs are turning their attention to the improvement and beautifying of the country and the country home, and have done notable work, particularly in Massachusetts.

The Chautauqua movement is becoming every year of increasing value in the education of the farmer. It is now becoming common to find these programmes offering courses in stock-judging, poultry-raising, seed-testing, etc.

With respect to the press, there are in the United States five hundred periodicals devoted to agriculture, while the dailies are giving an increasingly large amount of space to a discussion of agricultural topics.

CANADA.

Nova Scotia.

Technical education in Nova Scotia is under the immediate supervision of a director who is also principal of the Nova Scotia Technical College. This aids in co-ordinating the work of the elementary schools with the work of the special technical schools. The most important of these is the school referred to above, where courses in mining, metallurgy, mechanical and electrical engineering and kindred subjects are taught. Affiliated with the Technical College, are the universities of King's at Windsor, Dalhousie at Halifax, Acadia at Wolfville, and St. Francis Xavier at Antigonish. At all these institutions, there are departments of science which bear on the more advanced side of industrial education.

Nova Scotia is well provided with secondary technical schools. There are three types: (1) Coal-mining schools—to train men

* Bureau of Education, 1913. Part I.

for collier managers, underground managers and over men; (2) Engineering schools—to instruct engineers, firemen, etc., in steel and mechanical engineering; (3) Technical schools, where artisans or people who are engaged in commercial life are given evening instruction in mathematics, English, bookkeeping, etc.

Interest in rural industries is promoted by the Agricultural College, and also by the Provincial Normal School, which is affiliated with the College. Both of these institutions are situated at Truro. The College is patterned to a considerable extent after the Ontario Agricultural College. A summer school is conducted by this institution which provides courses in rural science for teachers.

Farmers' Associations, Fruit Growers' Associations, Agricultural Societies, etc., further the above work.

New Brunswick.

There is as yet no separate system of training for industrial workers. In the elementary consolidated schools, manual training, domestic science, and nature study are developed, but not with a special industrial trend.

At the Normal School in Fredericton, there is a manual training department, and a school garden.

The Department of Applied Science at the University of New Brunswick at Fredericton gives a thorough and practical training in engineering and forestry. The University of Mount Allison College at Sackville has a faculty of applied science. This faculty is affiliated with McGill University, and students go there after taking the first two years at Mount Allison. There is also a ladies' college at Mount Allison, where part of the time is devoted to cookery, sewing, home-nursing and home economics.

With respect to training for the agricultural industry, a correspondingly small amount has been done. There are the agricultural societies, farmers' institutes, etc., but no separate institutions. Many students from New Brunswick attend the Agricultural College, at Truro, N.S., and bring back to the farms of their own province the benefits of specific training.

Prince Edward Island.

With reference to this Province, the Department of Education writes as follows: "There is no technical education worth talking about given in this Province. The public school teachers are given some knowledge of manual training and household science while attending Prince of Wales College and Normal School, but apart from the work done in these subjects in the schools of Charlottetown and Summerside, our schools do not deal with them to any appreciable extent

"In agriculture, however, a good deal is being done. Elementary agriculture forms a part of the course of study in all our schools. Last summer nearly three hundred teachers were given a two-weeks' course at summer school to enable them to teach the subject more thoroughly. Agriculture forms an important part of the ordinary course of study in Prince of Wales College. In addition to this, special courses are given in agriculture. Very important educational work is being done through experimental farms and farmers' institutes. All agricultural education is under control of Dominion and Provincial Agricultural Departments."

Quebec.

Reports received from the Department of Public Instruction give the following data: There are three separate institutions for technical training—the Technical School, Montreal; The Technical School, Quebec City; and the Technical School, at Shawinigan Falls. The first two are financed by public funds, while the last is the result of private effort. All these schools have both day and evening departments, and attempt to teach the theory and some of the practice of the trades in their particular locality.

The Polytechnic School of Laval University, Montreal, takes the place of the faculty of applied science in other universities. There are two main divisions—engineering and architecture. Each division provides a four-year-course. The faculty of applied science at McGill University offers advanced courses in architecture, chemistry, chemical engineering, civil engineering and surveying, electrical, mechanical, metallurgical and mining engineering, and transportation.

Classes are conducted by the Council of Arts and Manufactures in some eleven centres throughout the Province, the chief being Montreal, Quebec, St. Hyacinthe, Sherbrooke and Three Rivers. The chief aim is to offer instruction in drawing, and in its useful applications to industrial purposes. This includes modelling, freehand drawing, lithography, architectural drawing, mechanical drawing, sign painting and lettering, boot and shoe pattern making, carpentry, joinery, stair-building, drawing as applied to plumbing, steam fitting, electric installation, etc.

Some public schools in the more prosperous districts have manual training, but it is treated largely as an academic subject.

As for agricultural education, there is the Macdonald College at Ste. Anne de Bellevue, which gives a course similar to that at Guelph. There are three departments—a school for agriculture, a school for teachers, and a school for household science. There is an Agricultural Department at Laval University, known as Oka College. The regular course of this school covers three years.

There is also a preparatory course for pupils whose previous education and knowledge are found to be inadequate, and a special course for older pupils who are unable to take the full work.

In agricultural education not much is being done in the rural elementary schools. The movement for consolidation is strongly advocated in recent reports, and some cases are cited where consolidated schools have nature study courses and a school garden.

Manitoba.

With respect to technical education in Manitoba, the Deputy Minister of Education writes as follows: "The city of Winnipeg has two large technical high schools in which all students receive a certain amount of industrial training, and in which any student may specialize to some extent in a number of mechanical callings. Evening classes are conducted in these schools for apprentices and journeymen in the various lines of activity for which the buildings are equipped. I think you will find the work done in Winnipeg, along industrial lines, in both day and evening classes, compares favorably with that done in other cities."

The report accompanying the above records classes in wood-working, sewing and cooking, in several towns and cities. In Winnipeg, this work is carefully systematized for the girls, and a corresponding course in manual training is conducted for the boys.

At the head of the agricultural education in Manitoba is the Manitoba Agricultural College, Winnipeg. A new building was opened October, 1913, which provides courses similar to that of the college at Guelph, Ontario, and has a like purpose with respect to the agricultural interests of the Province. There is a Government experimental farm at Brandon where the various kinds of crops suitable to the Province are tested.

In the elementary schools, nature study and school-garden work has been started. The Department of Education has instituted a course of agriculture in consolidated and town schools. This is the same as given during the two years' preparatory course in the Agricultural College. The first-year course includes field and animal husbandry, veterinary science, dairy husbandry, horticulture, botany, agricultural engineering, and English. The second-year course takes more advanced work along the same lines.

Saskatchewan.

Manual training and domestic science are taught to some extent in the public schools of Regina, Moose Jaw and Saskatoon. This, however, is by special arrangement with the Department, as there is no general plan for this kind of training.

In the Normal School at Regina, there is an arrangement whereby the male members of the class receive half a day a week in manual training, using the equipment of the public school.

There is as yet no special industrial trend to secondary education, nor is there a faculty of applied science at the Provincial University, Saskatoon.

Agriculture.—There is a provision in the law for nature study in the public schools, but the Deputy Minister of Education states that he does not know of any place where it has been carried out. He further adds that the matter of school gardens has been discussed, but nothing has been done.

There is an Agricultural College in connection with the University of Saskatchewan. It is being developed along three lines—investigation, teaching and extension work. The scope of the latter covers agricultural societies, farmers' institutes, excursions to the experimental farm, farmers' clubs, etc.

Alberta.

As in Saskatchewan, manual training and domestic science in the public schools is confined to the cities, Edmonton and Calgary, being the chief centres.

In the Normal School at Calgary, manual training is part of the course for men, but domestic science is not part of the training for women.

The cities of Edmonton and Calgary have appointed directors of industrial education, and have taken steps to establish separate schools for industrial purposes. Both day and evening work is being carried on at Edmonton, and evening work only at Calgary.

The University of Alberta, which is situated at South Edmonton, has a department of civil and municipal engineering; applied science is also taken in conjunction with the ordinary Arts course. The University offers courses leading to the degree of B.Sc. in pure science, and B.Sc. in applied science.

Agriculture.—Nature study and the school garden occupy a very small place in the public schools and the normal school. There is no system of agricultural training in the secondary schools, nor does Alberta possess an agricultural college. The Department of Agriculture helps the farmer with expert advice, financial grants, and by supervision of varied movements in farming communities. There is an experimental farm at Lethbridge, which is doing much for the agricultural interests.

British Columbia.

Manual training is carried on in thirty-one centres in the Province, the great majority of these being located in Vancouver.

Victoria, and New Westminster. Household science is taught in fifteen centres. Thirty-seven public school teachers give one day per week to sewing. Very little technical training has been undertaken in any of the twenty-two high schools of the Province. In Vancouver High School manual training is offered, but it is voluntary. The girls are taught needle-work on the same plan. With regard to evening schools, there are seven centres, in which some seventeen subjects are taught, covering the range of industrial and commercial operations.

The McGill University College of British Columbia is affiliated with McGill University, Montreal. It offers the first two years of the applied science course of the parent institution. In this course, extensive shop-work practice is given in carpentry, wood turning, smith work, foundry work, and machine shop work.

There are no separate agricultural schools in the Province. Regarding the work of the Department of Agriculture, the Deputy Minister writes as follows: "There are 100 Farmers' Institutes with a membership of 8,000. Short courses are given in the various operations of fruit growing, stock raising, etc. There are 34 Women's Institutes, from which lecturers are sent out to deal with such subjects as cooking, dressmaking, and the various domestic operations. There are 70 incorporated agricultural associations which hold annual fairs throughout the Province. During the last four years packing schools have been held under the direction of the horticultural branch."

Ontario.

With respect to industrial education in the Province of Ontario, we might first speak of those schools which have both day and evening classes. Toronto, Hamilton, London, Brantford, Sault Ste. Marie, Sudbury and Haileybury are the only places which at present (1913-14) provide day classes for industrial improvement.

The Technical School now in course of construction in Toronto will provide accommodation for 2,000 day pupils and 5,000 night pupils. The courses to be given at this school, and which are given at present, as far as equipment will permit, are set forth in the calendar as follows:

For day pupils.—(a) Industrial courses (general and special) extending over four years for boys, and over three years for girls; one-half of the time in the last two years in each course to be devoted to actual shop practice. For admission, pupils require to present a certificate of having obtained at least fourth form standing in a public school; (b) matriculation courses extending over four years, admitting to university departments of applied

science and household science. For admission to this course, pupils require high school entrance standing; (c) special short courses of theoretical and practical technology including courses for part-time students, pupils to be admitted at the discretion of the principal; (d) courses in fine and applied arts, with special adaptation to the industries, pupils to be admitted at the discretion of the principal.

For evening pupils.—(a) Industrial courses, with practical demonstrations under the direction of skilled workmen, open only to those actually engaged in the trade or occupation; (b) technical courses, including theoretical and applied mathematics; (c) art courses specially adapted to the industries; (d) domestic science courses. With respect to the evening work of this school, the work of the first year is also carried on in three branches. A junior branch is also conducted in connection with the evening school, where work of a more general character is taken.

In Hamilton, industrial training is carried on in the Technical and Art School connected with the Collegiate. For admission to the day school, pupils must be fourteen years of age, and if they have not passed the high school entrance, they must satisfy the principal that they can benefit by the work. The regular day pupils are instructed in English, mathematics, science, wood-working, forging, machine shop practice, mechanical drawing, freehand drawing, and electricity. Special day courses are also offered in industrial designing, including wall paper, book covers, posters, jewellery, fabrics; and in china painting, clay modelling, cooking and dressmaking.

Regarding the evening school, the classes are open three evenings a week, and provide instruction in mathematics, physics, chemistry, forging, experimental electricity, machine shop practice, woodworking, printing, mechanical drawing, architectural drawing, dressmaking, millinery, cookery, and a number of branches of fine and applied art. A large number of pupils in the Collegiate receive part-time instruction in woodworking, metal working, cookery, sewing and freehand drawing.

In London, work of an industrial character is carried on in both day and evening classes. The day school has a course for boys and one for girls. The one for boys includes English, penmanship, mathematics, geography, history, civics, mechanical and freehand drawing, physical culture, machine shop practice, forge shop practice and woodworking. The course for girls includes the general subjects referred to in the boys' course, with dressmaking, millinery, cooking and home economics substituted for the shop work.

Speaking of the evening school, the course begins in October and lasts to the end of April. The courses for men are arranged in three groups—(1) machine shop practice, forge shop practice, woodworking, pattern making, building construction; (2) mechanical drawing, architectural drawing; (3) mathematics and English. There are three courses for girls—(1) dressmaking and millinery; (2) cooking and home economics; (3) practical English. The object of the course for women and girls is largely domestic. Part time co-operative courses are also being started, and the manufacturers of London are showing a willingness to assist with the plans.

In the day school in Brantford, the following subjects are taken in the forenoon:—Mechanical drawing; shop mathematics, including problems on belts, pulleys, speeds and gearings; house building, general construction, roofing, angles of the hips, rafters, etc.; lessons on steam engines, steam pressure, water, latent heat, gauges, thermometer, barometer; simple problems in mechanics, work, energy and power.

The following subjects are taken in the afternoon:—Science, geography, reading, spelling, literature, arithmetic, composition, and writing. These are taken up by the members of the Collegiate staff. At the same time, the industrial teacher is taking manual training with the boys in the Collegiate. In the evening, the following courses are offered:—Elementary and advanced mathematics, mechanical drawing, machine design, building construction, architecture, science, practical sheet and plate metal work. These classes are conducted for three nights a week.

In the High and Technical School at Sault Ste. Marie, the day work consists of co-operative part time courses in which some employees of the Algoma Iron Works spend part of their time in the school. This work bears directly on the work in the shop. Nearly all the pupils in attendance at the high school take some of the work in the technical department. Evening classes are held three times a week, the majority of the pupils being employees working at the steel plant.

In Sudbury, there is a day Industrial and Technical Mining School. The mining course was organized in 1910 under the control of the high school board. The course of study has been planned primarily to fit students of the high school for positions in the mines adjacent to the town. Provision has also been made for men, who have sufficient previous knowledge to do so, to take short courses during the winter in mineralogy, chemistry, and fire assaying. A similar school exists in connection with the high school at Haileybury.

Evening industrial schools are (1913-14) in operation in Berlin, Brockville, Collingwood, Galt, Guelph, Stratford, St. Thomas, Cornwall, Kingston, Peterboro', Windsor, Drayton, Fort William, Ingersoll, Ottawa, Owen Sound, Paris, Pembroke, Port Arthur, Renfrew, Smith's Falls. In nearly all cases the collegiate institute buildings are used, and most of the academic work is taken by the teachers in the collegiate. The following are the courses of study, each locality selecting the particular parts which meet their need:—(1) for boys and men—freehand drawing, mechanical drawing, architectural drawing, design, modelling, woodworking, metal working, electrical working, building construction, printing, plumbing, physics, chemistry, mechanics, workshop mathematics, estimating, business English, and industrial commercial work; (2) Subjects for girls and women—cookery, home economics, first aid, home nursing, hand sewing, machine sewing, dressmaking, millinery, embroidery, and laundry work; freehand drawing, design, business English, industrial commercial work, mathematics; (3) Additional subjects—English literature, history and civics, physiology and hygiene, and physical culture.

Manual training as taken at present in the schools not previously referred to, is regarded as simply one of the so-called cultural subjects. It is now taught in 26 out of 279 urban municipalities and in one township. The Ontario Agricultural College at Guelph has a manual training department with three distinct courses—(1) A course for agricultural students in woodworking, metal working, and farm mechanics; (2) a normal course for the training of teachers; (3) optional courses in wood carving, art metal, etc.

Household science has as yet a very slight industrial trend in our public and secondary schools. Twenty-one out of 279 urban districts provide for the teaching of the subject. There are few schools in which the whole science of housekeeping and homemaking is taught. In a few cases, sewing is being introduced, but cookery is the only subject in the majority of the schools.

Specific courses for applied art are given in The Ontario College of Art, Toronto; the Industrial Art Department of the Technical School, Toronto; and in the Art Department of the Hamilton Technical School. While it does not form a separate department of the other industrial schools of the Province, it is, however, developed to some extent in nearly all of them.

The Young Men's Christian Association has done much to help along the industrial education movement. The association has branches in Toronto, Belleville, Brantford, Collingwood, Galt, London, Peterboro', Port Hope, St. Catharines, and Stratford. The chief vocational courses it offers are the commercial subjects, mechanical drawing, shop arithmetic, and sign painting.

Much work has been accomplished by correspondence schools. These are chiefly American concerns which offer courses in nearly every conceivable subject.

Education of a more technical character is given in the Faculty of Applied Science and Engineering, University of Toronto. This faculty has departments of civil engineering, mining engineering, mechanical engineering, architecture, analytical and applied chemistry, chemical engineering, and electrical engineering. These departments lead to the diploma of Bachelor of Applied Science. Provision for technical education is also made in the School of Mining, Kingston, which is affiliated with Queen's University. It provides both theoretical and practical instruction for mining, civil, electrical, mechanical, and chemical engineering. Courses are also offered for metallurgists, prospectors, mining foremen and all connected with the mining interests. The Royal Military College at Kingston teaches military, civil, electrical, and mechanical engineering. Many of the graduates of this institution go into civil life, and thus make an addition to the technically trained men of the province.

There are not many apprenticeship schools in Ontario. The Grand Trunk Railway has an apprenticeship school in connection with their shops at Stratford. Here the men get instruction in the practical work of the shop, and two evenings a week are devoted to drawing and mathematics. The New York Central Railway has a similar school at St. Thomas. One manufacturing concern—The Dennis Wire & Iron Works, London—has established a class for its workmen, in which instruction is given in the theory and practice of the work in the shop.

Agricultural education in the Province has made rapid strides in the last decade. In the first four forms in the public school, nature study is obligatory. In form five, there is an agricultural course which is optional. Each normal school is provided with a school garden, where practical instruction is given to the prospective teacher. To further aid these teachers, a summer course is held at the College at Guelph. Also, a special three months' course is given at this school for teachers. The government makes special grants for rural schools to encourage the maintenance of school gardens, and also to the teachers of these schools who take the course at the Agricultural College.

Regarding the high and continuation schools, their programme provides for courses in agriculture and horticulture. In many cases, graduates from the Ontario Agricultural College have charge of these courses. These teachers also act as county representatives of the Department of Agriculture. Some twenty schools have these courses in operation.

Ontario has received \$195,000 as its share of the Federal grant to agriculture. Part of this is to be spent in further stimulating interest in agriculture in both the primary and secondary schools.

There are many local agencies throughout the Province that are doing much to promote rural education. Among the more important, we might mention Farmers' Clubs, Lectures by representatives of the Agricultural College, Farmers' Institutes, Women's Institutes, Fall Fairs, and Bulletins issued by the Department of Agriculture.

At the head of the Agricultural education in the Province stands the Ontario Agricultural College at Guelph. It is affiliated with the University of Toronto, and the degree of B.S.A. is given at the end of a four years' course. Only a small percentage completes the full four years' course, as provision is made for some definite part of the work being taken each year. From fifty to seventy per cent. return to the farm after one or two years. Short courses are given in the winter in stock-judging, poultry, and sheep culture, fruit growing, butter and cheese making. In the Ontario Agricultural and Experimental Union, there are some 6,000 farmers experimenting on their own farm and making annual reports to the College. The College gives advice to teachers and trustees regarding school gardens. The teachers at the College visit the rural districts and hold meetings. Also the farmers visit the college and inspect the model farm under the guidance of the staff. Students from the College visit the farms and lay plans for drainage, etc. Demonstrations of butter-making, pruning and spraying, are held at different points throughout the Province.

The Province also maintains a Department of Forestry at the University of Toronto.

Chapter IV

SOME DATA WITH RESPECT TO OUR PROVINCE

The question of what form vocational training should take in any particular country is, and always will be, a difficult problem. The school is a machine for the manufacture of citizens, and when the question is asked, "Which of all the various systems will make the best citizen?" the answer depends entirely on what the term citizen connotes. What would suit in a democratic country like our own, would not of necessity suit in France or Germany. For example, some features of the excellent German system we would regard as unsuitable. Her training, as far as we can learn, is either for the selected few who will be the leaders in the industries, or for those who are in the trades, which are still in the handieraft stage. We cannot see how, in a country like ours, with its vaunted democracy, any system would be tolerated which would not give the boy who enters at the bottom a chance to rise to the top if he possessed the ability to do so.

We consider, then, that a stock-taking of some facts with respect to our Province would be of value. We will first give details of what the majority of the people are doing. In this connection, we will give figures, as far as possible, based on the census of 1911, and also on that of 1901. This should help us to see the growth or decline of the industries. As regards the manufacturing industries, we will also give data with respect to the value of the output in 1901 and 1911. Secondly, we will give an outline of the resources of our province which should help us to determine what the people will be doing in the future. Thirdly, we will give the results of some questions submitted to the manufacturers of the Province, which should help us to a more practical solution.

TABLE NO. 1.

The number of employees in one hundred of the industries of Ontario, and also the value of the output

	Number of Employees.		Value of Output.	
	1901	1911	1901	1911
Log products	23,478	21,738	\$25,947,041	\$20,397,980
Foundry and machine shop products.	7,708	18,015	9,145,382	29,323,360
Women's clothing	6,808	11,773	4,243,410	15,542,574
Men's clothing	5,863	8,969	8,835,945	14,703,780
Agricultural implements	5,577	8,029	8,295,170	19,293,098
Lumber products	3,980	7,061	6,152,853	17,776,684

TABLE NO. 1—Continued

The number of employees in one hundred of the industries of Ontario, and also the value of the output.

	Number of Employees		Value of Output	
	1901	1911	1901	1911
Furniture and upholstered goods..	5,373	6,490	5,212,997	9,241,000
Hosiery and knit goods	3,064	6,320	3,277,439	10,062,703
Car repairs	1,821	5,797	1,811,694	6,902,607
Bread, biscuits and confectionery..	3,310	5,639	6,102,430	14,067,357
Printing and bookbinding	2,149	5,506	2,217,924	8,312,239
Fruit and vegetable canning	3,921	5,319	2,381,288	5,475,121
Boots and shoes	2,286	4,627	3,110,211	9,079,445
Printing and publishing	4,116	4,248	4,859,876	6,690,093
Brick, tile and pottery	3,768	4,210	1,933,859	4,125,656
Flour and grist mill products....	2,441	4,133	21,025,481	52,721,625
Carriages and wagons	3,278	3,831	4,673,952	8,547,502
Electrical apparatus and supplies..	935	3,737	1,171,543	7,050,000
Boilers and engines	2,226	3,121	2,592,643	4,903,203
Woollen goods	4,114	3,108	4,856,871	4,017,316
Musical instruments	3,228	2,823	2,804,057	5,189,888
Leather, tanned and finished....	1,940	2,705	6,250,817	14,737,756
Butter and cheese	2,733	2,050	14,968,922	18,148,629
Automobiles .....	.....	2,438	.....	6,251,885
Cottons	2,361	2,353	2,907,879	4,134,489
Plumbing and tin-smithing	1,481	2,314	2,530,639	5,369,033
Furnished goods—mens	1,336	1,997	1,557,812	3,563,392
Hats, caps and furs.....	1,358	1,687	1,885,392	4,340,571
Electric light and power	488	1,664	901,492	7,050,000
Slaughtering and meat packing..	1,541	1,623	17,041,835	20,935,164
Boxes and paper bags	833	1,575	719,050	1,761,006
Cars and car works	436	1,336	1,073,375	2,710,716
Cement, Portland	488	1,232	619,018	3,145,934
Liquors, malt	1,218	1,323	3,329,549	5,121,816
Smelting	868	1,272	1,894,012	12,987,792
Carriage and wagon materials...	814	1,267	1,111,500	2,872,352
Ships and ship repairing.....	754	1,238	637,586	2,034,223
Rubber and elastic goods.....	517	1,226	1,134,500	5,437,886
Evaporated fruits and vegetables..	1,522	1,222	385,140	445,729
Slaughtering, not including meat packing .....	....	1,188	.....	7,180,280
Wood pulp, chemical and mechani- cal	632	1,187	851,715	4,487,827
Gas, lighting and heating.....	585	1,179	1,163,872	3,127,441
Cooperage	541	1,153	585,414	1,901,010
Flax, dressed	1,014	1,128	338,176	548,559
Boxes, wooden	785	1,127	811,075	1,547,425
Bridges, iron and steel.....	392	1,082	737,000	3,283,410
Interior decorations	81	1,062	79,950	1,639,932
Carpets	338	1,031	559,892	1,963,000
Glass	819	1,008	620,701	1,315,790
Paper	820	1,006	1,735,705	3,002,568
Brass castings	384	1,003	542,826	1,719,400
Axes and tools	879	984	888,811	1,843,168
Dyeing and cleaning	130	886	32,700	731,448

TABLE NO. 1—*Continued*

The number of employees in one hundred of the industries of Ontario, and also the value of the output.

	Number of Employees		Value of Output	
	1901	1911	1901	1911
Harness and saddlery	1,279	854	1,653,715	2,031,187
Hardware, carriage and saddlery.	473	848	384,674	952,050
Oils	580	777	3,116,144	5,884,457
Patent medicines	340	765	747,874	2,462,271
Jewelry and repairs	405	758	500,835	1,684,721
Cordage, rope and twine	529	716	970,623	2,738,817
Liquors, distilled	518	715	1,567,418	10,376,267
Gloves and mittens	655	698	799,245	2,131,187
Leather goods	40	690	72,600	1,200,069
Brooms and brushes	635	668	761,183	1,271,368
Silversmithing.	417	633	669,209	1,283,499
Stationery goods	541	621	580,322	1,099,192
Mica, cut	166	617	242,402	293,787
Musical instrument material	285	595	356,997	920,494
Plumbers' supplies	305	568	646,184	1,375,014
Drugs	415	559	790,142	2,168,149
Wire	278	551	476,756	1,090,976
Pumps and windmills	515	539	722,621	1,390,888
Baskets	323	522	146,532	443,720
Boats and canoes	119	494	109,021	629,372
Coffins and caskets	367	479	465,800	860,142
Picture frames	504	476	516,700	669,398
Corsets and supplies	447	474	411,591	611,097
Mattresses and spring beds	162	472	271,050	1,121,028
Seed cleaning and preparing	565	456	1,471,587	1,484,485
Aerated and mineral waters	163	452	254,182	875,173
Starch	262	437	948,500	1,686,934
Wire fencing	119	414	276,800	2,176,625
Elevators	168	389	207,100	1,160,086
Buttons	285	386	137,000	358,000
Cement, blocks and tiles .....	...	380	.....	815,190
Soap	334	373	1,232,350	2,511,353
Monuments and tombstones	270	368	344,623	790,085
Woodworking and turning	643	332	648,470	399,659
Refrigerators	102	323	130,724	556,000
Paints and varnishes	92	316	472,001	2,287,729
Saws	216	314	253,232	591,200
Woollen yarns	55	299	83,600	4,017,316
Glass, stained, cut and orna- mental	46	295	50,000	442,766
Condensed milk .....	...	289	.....	1,335,689
Woodenware .....	...	279	.....	295,114
Vinegar and pickles	212	267	286,532	956,480
Brass and iron beds .....	...	268	.....	578,748
Lime	426	266	260,114	294,198
Cream separators .....	...	262	.....	639,656
Lock and gunsmithing .....	...	262	.....	282,123
Window blinds and shades	295	262	738,532	691,000

Total employees in manufacturing establishments (based on information furnished by Government to Sir William Meredith in connection with Workmen's Compensation Act)—354,000. In Toronto, 78,000.

TABLE NO. 2

Showing the percentage increase or decrease in the number of employees and also in the value of the output.

	Employees.		Value of Output.	
	Increase.	Decrease.	Increase.	Decrease.
Log products .....	..	7	..	21
Foundry and machine shop products.	134	..	220	..
Women's clothing	72	..	289	..
Men's clothing	53	..	66	..
Agricultural implements	60	..	132	..
Lumber products	77	..	188	..
Furniture and upholstered goods.	20	..	77	..
Hosiery and knit goods	103	..	207	..
Car repairs	218	..	281	..
Bread, biscuits and confectionery.	70	..	135	..
Printing and bookbinding	156	..	229	..
Fruit and vegetable canning.	35	..	129	..
Boots and shoes	102	..	191	..
Printing and publishing .....	..	4	..	37
Brick, tile and pottery	11	..	113	..
Flour and grist mill products.	69	..	140	..
Carriages and wagons	16	..	82	..
Electrical apparatus and supplies.	342	..	501	..
Boilers and engines	40	..	89	..
Woollen goods .....	..	33	..	15
Musical instruments	20	..	85	..
Leather, tanned and finished	39	..	135	..
Butter and cheese .....	..	33	21	..
Automobiles. ....	..	..	..	..
Cottons. ....	..	3	42	..
Plumbing and tinsmithing	56	..	112	..
Furnished goods—men's	49	..	129	..
Hats, caps and furs	24	..	130	..
Electric light and power	240	..	682	..
Slaughtering and meat packing.	5	..	22	..
Boxes and paper bags	89	..	144	..
Cars and car works .....	..	..	..	..
Cement, Portland	172	..	408	..
Liquors, malt	8	..	53	..
Smelting.	40	..	585	..
Carriage and wagon materials.	55	..	158	..
Ship and ship repairing	64	..	219	..
Rubber and elastic goods	137	..	388	..
Evaporated fruits and vegetables. ....	..	24	15	..
Slaughtering, not including meat packing	..	..	..	..
Wood pulp, chemical and mechanical	87	..	426	..
Gas, lighting and heating	101	..	168	..
Cooperage.	113	..	224	..
Flax, dressed	11	..	62	..
Boxes, wooden	48	..	90	..
Bridges, iron and steel	176	..	345	..
Interior decorations	1,211	..	1,951	..
Carpets.	205	..	250	..
Glass.	23	..	112	..
Paper.	22	..	73	..

TABLE NO. 2—*Continued*

Showing the percentage increase or decrease in the number of employees and also in the value of the output.

	Employees.		Value of Output.	
	Increase	Decrease	Increase	Decrease
Brass castings	161	..	216	..
Axes and tools	13	..	107	..
Dyeing and cleaning	581	..	2,136	..
Harness and saddlery .....	..	49	22	..
Hardware, carriage and saddlery...	78	..	147	..
Oils	33	..	88	..
Patent medicines	125	..	229	..
Jewelry and repairs	87	..	236	..
Cordage, rope and twine	35	..	182	..
Liquors, distilled	38	..	562	..
Gloves and mittens	6	..	154	..
Leather goods	762	..	1,533	..
Brooms and brushes	5	..	67	..
Silversmithing	51	..	91	..
Stationery goods	14	..	89	..
Mica, cut .....	..	..	..	..
Musical instrument material	110	..	157	..
Plumbers' supplies	92	..	112	..
Drugs	34	..	174	..
Wire	98	..	128	..
Pumps and windmills	4	..	92	..
Baskets	61	..	202	..
Boats and canoes	352	..	477	..
Coffins and caskets	30	..	84	..
Picture frames .....	..	5	29	..
Corsets and supplies	6	..	48	..
Mattresses and spring beds	192	..	313	..
Seed cleaning and preparing .....	..	23	9	..
Aerated and mineral waters	177	..	244	..
Starch	66	..	77	..
Wire fencing	247	..	693	..
Elevators	131	..	560	..
Buttons	35	..	161	..
Cement blocks and tile	317	..	..	..
Soap	11	..	103	..
Monuments and tombstones	35	..	129	..
Woodworking and turning .....	..	93	..	62
Refrigerators	216	..	325	..
Paints and Varnishes	24	..	384	..
Saws	45	..	133	..
Woollen yarns	443	..	1,705	..
Glass, stained, cut or ornamental...	541	..	785	..
Condensed milk .....	..	..	..	..
Woodenware .....	..	..	..	..
Vinegar and pickles	26	..	233	..
Brass and iron beds .....	..	..	..	..
Lime .....	..	60	15	..
Cream separators .....	..	..	..	..
Lock and gunsmithing .....	..	..	..	..
Window blinds and shades .....	..	12	6	..

According to the 1912 report of the Bureau of Mines, the number of employees in the mining industry of the Province is— (1) Metallic products, 10,909; (2) Non-metallic products, 8,804—making a total of 19,713. Included in the non-metallic are those engaged in making brick, tile, and Portland cement, which are already given in the manufacturing industries. These three products employ 5,125 hands, leaving 14,588 not already accounted for.

Many of the artisans of our Province are not listed with the manufacturing establishments, so statistics were not easily available. The following figures were obtained by adding the data given in the 1912 report of the Ontario Bureau of Labor for the different unions, supplemented by investigations which the Secretary of the Bureau made in our behalf as to the percentage belonging to the union in any particular trade:—

Carpenters and joiners.....	about	10,000
Bricklayers, masons and carpenters....	"	9,000
Builders' laborers	"	3,500
Plumbers and steamfitters.....	"	1,000
Conductors, locomotive engineers, rail- road trainmen- maintenance of ways, railway carmen, railway telegraphers	"	7,850

According to the 1912 report of Game and Fisheries, there are 3,300 fishermen in the Province. (We were unable to secure any reliable data which would give number employed in these different lines 10 years ago.)

The rural population of Ontario has decreased with each census, which, taken in conjunction with the total population of the Province, shows the change from rural to urban. The figures are—

	1891	1901	1911
Total population	2,114,321	2,182,947	2,533,274
Rural population	1,295,323	1,246,969	1,194,785

In the "Occupation of the People" based on the census of 1901, the "Agricultural class" is given as 306,431. The "Occupation of the People" is not yet compiled on the basis of the 1911 census, but working out the proportion from the above data, we get 277,568 as Agricultural class. This is no doubt somewhat in excess of the number, as the tendency in the last decade has been towards larger holdings.

RESOURCES OF OUR PROVINCE.

The question of what will be the industries of the future will be, to a very great extent, the question of what are our resources. A convenient supply of raw material is a prime requisite for any industry, if it hopes to enter the field of competition.

One of the greatest assets of Ontario is its farm lands. Out of a total population of 2,523,274, 1,194,785 are classed as rural. The rural assessed area in 1911 was 24,706,699 acres, of which 14,323,478 acres were cleared. Of this cleared land over 10,000,000 acres were in crop. The estimated value of the field crop for 1911 was placed at two hundred millions. Some points regarding the farming industry in the older section of the Province might be noted. Dairying is one of the great industries of this part. The Dairy Bulletin of the Agricultural Department says—"With 97 creameries and 1,177 cheese factories, an industry has been built up which means much to the prosperity of the country. During the manufacturing season of 1911, the quantity of milk delivered to cheese factories was 1,361,046,459 pounds; the amount of cheese made therefrom was 125,611,359 pounds with a value of \$14,193,918. The quantity of milk made into butter at cheese factories and creameries was 198,334,532 pounds, and the butter produced therefrom was 9,015,206 pounds valued at \$2,175,955. The estimated value of butter made in farm dairies and of milk consumed on the farm, sent to condensed milk factories, and supplied to towns and cities is fifteen millions. This would make a total for the year 1911. of \$33,000,000. A recent letter from the Department of Agriculture gives the value of dairy products for the year 1913 as \$40,000,000.

The value of live stock in our Province from statistics for 1911 was \$214,720,424. The raising of horses, cattle, sheep and pigs is one of the chief means of revenue to the farmer. This is almost sure to continue, owing to the soil being well suited for meadow and pasture, and also for the growing of mixed grains.

Another element that goes to make farming a leading industry is fruit growing. In the southerly parts of the Province, on the shore of Lake Erie, we have the same latitude as Northern California and Southern France. In this section, therefore, we find wide stretches of peach orchards and grape vineyards. The finest belt of Ontario extends from east to west for a distance of over 400 miles, and from north to south for fifty to one hundred and fifty miles. Here is the home of the king of fruits, the apple, in its many varieties; and here also are peaches, quinces, plums, cherries, strawberries and other small fruits in abundance. Vast as is the production of fruit in Ontario, the demand in the

Dominion and abroad is greater than the supply, and that demand is increasing with the settlement of Northern Ontario and the Western Provinces. Besides the sale of fresh fruit, a large quantity is tinned at the canneries for shipment to the British Isles and elsewhere. Ontario produces 60 per cent. of the plums grown in Canada; 70 per cent. of the apples; 80 per cent. of the pears; 99 per cent. of the peaches, and 99 per cent. of the grapes. There are 1,670,000 fruit trees now yielding product in Ontario, while the annual average value of the fruit industry is over \$8,000,000. From 700,000 to 1,000,000 barrels of apples are exported annually, chiefly to Great Britain, and from 200,000 to 300,000 barrels to the Western Provinces. These are the facts because we have a suitable soil, an ideal climate, a sufficient rainfall with no need for irrigation and a reputation for excellent fruit products which is a world-wide asset.

The soil and climate of this older part of the Province are well suited to the growing of grains of all kinds. Not only in the older part, but also in that part of the Province known as New Ontario, where twenty million acres of agricultural land awaits the strong arm of the settler. The table land of rich black soil which extends from Lake Abitibi for 350 miles towards Lake Nipigon, with a width of from fifty to one hundred miles, is, in the opinion of experts, quite as assured of agricultural prosperity as was Southern Ontario a hundred years ago. The fertility of this Northern land is shown by recent cases where farmers have taken earth from the bottom of wells, and in it grown potatoes that would be a credit to any country.

Timber Resources.—According to the census of the manufacturers, the industry employing the largest number of men is "Log Products." Log products is there defined as "all products of the log—lath, lumber, pulp, shingles, staves, and spool wood." This would point to the fact that we have large timber resources. Such is indeed the case. According to the 1912 report of the Department of Lands, Forests and Mines, there is in this Province 202,000 square miles of wooded lands. In 1911 there were cut on Crown Lands alone 677,000,000 board feet of pine and other timbers and 173,000 cords of pulp wood. Our chief timber resources at present lie north of Lake Nipissing and the Great Lakes. This Northern Ontario district is one of the richest timbered countries in the world, and is practically untouched. It abounds in spruce, which, used as pulpwood, is equal to the European variety and constitutes in itself a great asset. The quantity is almost inexhaustible. Along the line of the Transcontinental Railway, it is estimated that there are 300,000,000 cords. Mr. Horne, a prominent lumberman of Fort William, writes:—"There are now at

work in this particular section of the country, some forty saw mills cutting from 100,000 to 1,000,000 feet a year. In the district between Fort William and Fort Frances, there are at least two billion feet of red and white pine, tributary to the Fort Frances and Rainy River mills, and probably more Jack pine. Along the Rainy River there is also an immense amount of cedar suitable for posts, poles, and ties."

The Government has set apart large tracts for forest reserves. The Temagami Forest Reserve has an area of 6,000 square miles; the Mississauga of about 3,000; the Nipigon of 7,300; and some smaller reserves, making a total of 19,030 square miles. There is also the National Park, known as Algonquin Park, with an area of about 2,000 square miles. When we couple these great timber areas with the excellent water facilities for transportation, we can easily forecast that log products will continue to be one of the chief industries for many years to come.

Mineral Resources.—Over 40 per cent. of the mineral production of Canada is furnished by Ontario. Ontario has in Cobalt the most productive silver field, and in Sudbury the most valuable nickel mines in the world. Canada takes third place in producing the world's annual supply of silver with a total of 34,000,000 ounces, 2,000,000 coming from British Columbia, the remainder being credited to the Cobalt mines.

We quote the following figures from the 1912 report of the Bureau of Mines. We will merely give the products as metallic and non-metallic, the table from which we quote giving the various minerals in each.

Mineral Productions, 1907—1911.

	1907	1908	1909	1910	1911
Metallic.....	\$14,250,035	\$16,754,986	\$22,928,496	\$28,479,482	\$29,285,258
Non-metallic....	10,468,538	8,882,631	10,052,879	11,152,217	12,873,930

The figures presented in the above, reflect the advance which the mining industry of the Province made during the five years under consideration. It will be seen that the output of metals has increased by 100 per cent. It is evident that the mining industry will prove of great service in the settlement of population in the Northern part of the Province. As exploration is extended, the pre-Cambrian formations will reveal their riches of metallic ores—gold, silver, nickel, copper, and iron.

The following from the report of the Bank of Commerce for 1912 is of interest—"The value of the ore deposit in Porcupine is estimated at \$25,000,000. About \$2,000,000 has been taken out this year and a production of \$6,000,000 is estimated for 1913. It seems evident that the camp will add to the world's output of gold about \$6,000,000 a year for some years to come."

The Toronto Globe, of September 10th. 1913, says—"Ontario's mineral production for the first six months of this year shows a large increase. From returns made to the Bureau of Mines, the gain in metallic ores amounts to about three and three-quarter millions of dollars, the total being \$18,598,804. Gold heads the list with a gain of \$1,935,949. In addition to gold, there is an increase of \$96,176 in copper, \$347,519 in nickel, \$108,264 in iron ore, and \$1,109,202 in pig iron. These increases are all derived from comparison with the production for the same period in 1912."

Water Resources.—Another great asset in Ontario is its lakes and rivers. The Great Lakes and the River St. Lawrence form the international boundary, and constitute the greatest chain of fresh water lakes and rivers in the world. The combined area of the lakes is 76,000 square miles. At the head of this system is Lake Superior, the largest body of fresh water in the world, being 383 miles long and 160 miles broad. Fort William and Port Arthur are situated on its northern shore, and are the lake terminals of three great transcontinental railway systems. Next comes Lake Huron, which is connected with Lake Superior by the Sault Ste. Marie River. Owing to a difference of level between the two lakes, we have here one of the largest locks in the world, permitting vessels of 10,000 tons to pass from one lake to the other. We can get some idea of the value of this water system to the industries by quoting the following table:—

The record of tonnage passing through the canal.

Canadian Canal—	1911	1912
Tonnage in freight.....	27,646,523	34,625,120
Registered tonnage of vessels..	17,114,644	22,545,852
American Canal—		
Tonnage in freight.....	19,722,711	28,158,744
Registered tonnage of vessels..	20,020,305	27,125,612

Lake Huron, with its expansion, Georgian Bay, not only continues the chain for vessels, but is of special value to the lumbering industry. Numerous rivers enter into these waters and afford excellent facilities for rafting logs, as well as power for mills of various kinds. These rivers, with smaller streams, drain a basin of 75,300 square miles. The construction of a ship canal to connect Georgian Bay with Montreal by way of the French River, Lake Nipissing, and Ottawa River, has been talked of for some time. This route would be about 440 miles in length, and would effect a saving of 340 miles in the distance from Lake Superior to the sea.

Lake Huron empties into River St. Clair, which in turn empties into Lake St. Clair. The waters of both Lake St. Clair and River St. Clair are shallow, but owing to the enormous traffic they have been, in great part, canalized and can accommodate the largest steamers.

The outlet of Lake St. Clair is the Detroit River, which empties into Lake Erie. Here is the terminal (Buffalo) for vessels having a draft of twenty feet or over. From Buffalo to Kingston the draft is limited by the Welland Canal to fourteen feet. The undertaking of the deepening and enlarging of the Welland Canal to permit the passage of vessels of thirty-one feet is already under way and will be completed in about five years. Plans are also under way to make the passage at Sault Ste. Marie the same depth as the Welland Canal. Running east from the mouth of the Detroit River is Lake Erie, some 250 miles in length. There are many harbors along its shores, which are terminals for vessels from the north. The connecting link between Lake Erie and Lake Ontario is the Welland Canal referred to above. The present canal is $26\frac{3}{4}$ miles in length.

Lake Ontario, which is the last of the Great Lakes, runs nearly east and west. It is about 180 miles long. The commerce of this lake consists at present chiefly of coal shipments from Charlotte, Great and Little Sodus Bays and Oswego to Canadian ports; of grain shipped through the Welland Canal to the St. Lawrence; and of lumber from Canadian ports. The outlet of Lake Ontario is the River St. Lawrence, which completes the great water chain referred to. It makes connection with the ocean-going vessels at Montreal and Quebec, and its value as a national trade route cannot be over-estimated. It is the shortest trade route from the Great Lakes to Europe.

For ocean vessels to steam from Fort William to Liverpool, three places in this water system will require deepening. Two of these have already been referred to—the Locks at Sault Ste. Marie and the Welland Canal. The third is the St. Lawrence canals. In connection with these, the Minister of Railways and Canals has stated that it is the intention to put them in the same condition as the new Welland Canal. This will mean that every city and town on this great chain can become a port for oceangoing vessels.

The value of this water system to our Province is at once apparent. The freight by boat being so much cheaper than by rail, makes it possible to market our products to better advantage. We can get our timber to the mill, or our ore to the smelter; we can get our grain to the American port or on to the ocean; we can get back our coal from the mines to the south of us. In fact,

everything we have to export and everything we need to import is cheapened in transportation as a result of this water system.

If the Province does not possess coal as one of its native resources, it has abundant power for generating electricity. The volume of water rushing over Niagara Falls alone is 12,000,000 cubic feet per minute, the far greater proportion of which falls on the Canadian side. Here there is a production of 400,000 horse-power, from which our own city of Toronto gets much of its power. There is estimated to be 90,000 horse-power within fifty miles of Ottawa, 60,000 of which is developed. The water power at Sault Ste. Marie is capable of developing 150,000 horse-power. Further, the St. Lawrence provides ample power. A wing dam on the north side of Lachine Rapids furnishes electricity to Montreal, and along the river there are numerous points on the tributaries where power can be generated.

With respect to our fisheries, the 1912 report of the Game and Fisheries Department, divides the district as follows—(1) Lake of the Woods and Rainy River; (2) Lake Superior; (3) Lake Huron (North Channel); (4) Georgian Bay; (5) Lake Huron (proper); (6) Lake St. Clair; (7) Lake Erie; (8) Lake Ontario; (9) Inland waters. The value of these waters from a fishing standpoint may be gathered from the fact that the value of the catch for 1911 was \$2,419,178.

The most important of the resources yet remains, and that is, the human resources—2,523,274 souls. Efforts are being made to develop the mine; the rugged settler is breaking up the fertile lands of the north; the forest is contributing its share to building up of homes for the people; the waters are being utilized for the advance of commerce—but are we doing all that we might do to develop our human assets? Coal mines and gold fields have limits; intellectual capacity has not found any yet. Wherever the bright nuggets of intellect are scattered, it is the business of the state to find them out, polish them, and make them useful. Germany is the great example of a nation that has not neglected the development of all its resources, men included. For example, in one city—Munich—there are forty different kinds of industrial continuation schools. While Germany's system of technical training is not the sole cause of her great commercial prosperity, yet it is regarded by the Germans as the chief cause. The question of quality in her work is being emphasized in training men for every industry, and the result is that her products are sought the world over.

We will complete our data by giving a copy of the letter sent out to the manufacturers:—

The Central Technical School,
149 College Street,
Toronto.

Toronto, November 8th, 1913.

Dear Sir:

I would very much like to have your assistance in connection with a thesis which I am preparing on "The Industrial Worker in Ontario." I, therefore, take the liberty of asking you the following questions and would be very grateful if you would favor me with a reply.

I. What percentage of your employees are engaged in work for which you regard no special preparation as necessary?

II. What form of education would you suggest which would tend to benefit those in the above class?

Some companies—The National Cash Register Co. for example—have attempted to give help to the above class with the hope of raising their interests beyond the routine of automatic operations, and hence develop a desire for more specific training. Among the methods used are the following:—(1) Athletic associations. (2) Grounds for sport. (3) Gymnasiums. (4) Social Clubs. (5) Reading rooms and libraries. (6) Picnics. (7) Banquets. (8) Illustrated lectures by Employers and Educationists.

III. What do you regard as the chief defect in the education of those of your employees not included in Question I.?

IV. What form of training would you suggest for this latter class?

Some of the main types of schools for industrial workers are the following:—

1. Continuation Schools—For pupils from 14-18. These schools continue the work of the elementary school, but make the industries the central feature. Other subjects as Mathematics, Science, Drawing, etc., are taught as bearing directly on the industries.

2. Co-operative Schools—Where part of the time is spent in the factory and the other in the school. The school work deals with the theory of the work done in the shop.

3. Apprenticeship Schools in Shops—Where a school is maintained by the employer offering industrial improvement courses to those in his employ.

4. Trade Schools—Where the whole time of the pupil is taken up working at the trade in which he desires to become proficient.

5. Higher Technical Schools—Where both theory and practice are developed with a view to turning out foremen, managers and leaders in industrial enterprises.

Assuring you that your assistance will be much appreciated, I am,

Yours sincerely,

In explanation of our questions, we might say that in deliberating upon this problem, we had from the outset the idea of dividing all workers into three classes—(1) workers of the hand; (2) workers of the hand and head; (3) workers of the head. Of course, we recognize that these divisions will not be clear cut, but it does seem to us a basis for discussion. Our first question—what percentage of your employees are engaged in work for which you regard no special preparation as necessary—was asked with a view to finding out what percentage might be put in class one. If we could get this, then the balance would be the number in classes 2 and 3. Our second question—what form of education would you suggest which would tend to benefit those in the above class—was asked for a number of reasons. First, we frequently hear that the manufacturer is not favorable to giving this class the advantages of education. Second, we wanted some practical opinions on the solution of the problem, and incidentally we might get some experiments which had been tried, with their result. The remaining two questions, namely—"What do you regard as the chief defect in the education of those of your employees not included in question 1," and "What form of education would you suggest for this latter class"—were asked in order to get suggestions for some form of training.

Chapter V.

SOME GENERAL CONCLUSIONS FROM DATA

Conclusions from Tables.—Perhaps the most general conclusion we could make from a glance at the tables is the great increase in the manufacturing industries. Out of the one hundred manufacturing industries listed, only three do not show an increase in the value of the output.

We might next remark on the very wide difference between the percentage increase in employees and the percentage increase in value of output. Inquiry from different sources would indicate that this is largely due to the increased use of machinery. One man can look after a machine which will turn out more and better work than a score of men. This fact is, we feel, amply illustrated by a comparison of the figures from the above viewpoint.

Perhaps the next most noticeable feature is that Ontario has in the last ten years changed from being predominantly an agricultural province to being predominantly a manufacturing province. The figures we repeat here—In 1901 there were less than 200,000 employees in factories and 306,431 listed as farm laborers. According to the figures ten years later, there were 354,000 employees in factories and 277,500 listed as farm laborers.

The figures also show a marked increase in the use of electricity. The uses to which it can be put is no doubt one of the greatest reasons for the increased use of machinery. This particular feature the tables do not show, but two items are worthy of notice—Electrical apparatus and supplies, with an increase of 342 per cent. in employees and 511 per cent. in value of output. Also electric light and power, with an increase of 280 per cent. in employees and 682 per cent. in value of output.

The question of a grant from the Federal Government for industrial and technical education is emphasized by these tables. The value of the annual agricultural production of the Province is \$300,000,000, while the value of the output of the manufacturing establishments is \$580,000,000. Also, as previously mentioned, there are more people engaged in the manufacturing industries than in farming. From the recent Federal grant to Agriculture, Ontario received \$195,000. The Departments of Agriculture and Education are co-operating in the spending of this money. Special courses for teachers, subsidies for rural boards and more advanced courses in the High Schools are among the places to be helped.

Is there not an equal need of help for industrial and technical education?

Conclusions from Study of Resources.—With respect to our resources, we think it has been shown that we have a Province rich in nearly everything that man could wish for. This garden of Canada, with its apple blossoms and vineyards; this northern district with its stretches of forest inviting the strong arm of the settler; this great chain of fresh-water lakes equalled nowhere in the world; these great beds of minerals that lie deep in the earth—all are ours. The responsibility for making the most of this great heritage rests with the people. We feel that there are some facts in connection with our Province which will show that we are not taking full advantage of our heritage, and also that such conditions might be improved by more wide-spread industrial education.

The following, from the 1912 report of the General Manager of the Bank of Commerce, is noteworthy in this connection:—"The total of our (Canada) foreign trade for the fiscal year ending March, 1912, was \$874,538,000. Our imports were \$559,220,000 and our exports \$315,317,000—the balance against us being \$243,903,000. The imports of iron and steel in various forms from raw material to highly complicated manufactures amount in value to \$95,000,000. Almost all these articles are already being made in Canada, but not in sufficient quantities or not of high enough quality to satisfy our requirements. It is to this large difference between our exports and imports which causes us to send so many securities to the London market. If it be true that we are offering too many securities, it would mean that we are importing too many goods and exporting too little."

Other instances might be given where we export the raw material and import the finished product. We export pulpwood and import paper; we export wool and import yarn, socks, and tweeds; we export hides and import leather. In connection with this latter item, one of the large leather manufacturers of this city writes us as follows:—"The making of leather is an industry in which we have only recently recognized that scientific knowledge was essential. To-day the tannery chemist is consulted more or less regularly by all the large tanners. A large part of this chemical work goes to the United States. There is undoubtedly a field in Ontario for thoroughly competent leather workers."

The following, from a speech delivered by Mr. Hugh D. Scully, Secretary of the Canadian Home Market Association, on December 2nd, 1913, is of interest here:—"The people of Canada spend three-quarters of a million every day to buy goods manufactured

in the United States. The total trade of Canada for the fiscal year just past is estimated at \$1,100,000,000, of which \$700,000,000 represents the imports. The Canadian Home Market Association is endeavoring to overcome the feeling of attractiveness of foreign trade. Particularly in the Canadian West is this necessary, as American settlers ask for American trade-marked goods as soon as they get there, and before they become acquainted with Canadian-made articles. The 'Made in Canada' train is doing much to familiarize Canadians with the products of this country. It is hoped that some day soon the slogan 'Made in Canada' will mean as much to this country as does the slogan 'Made in Germany' to the Germans and German manufacturers."

We recognize that to make the statement that our raw products should invariably be developed instead of importing the finished article, would in many cases introduce other difficulties. For example, our iron ore is much richer in sulphur than the high-grade American ore from the Mesabie Range, and hence costs more to reduce it, but it is also a fact that this grade of American ore will soon be exhausted and they will then have to use the same grade as ours. Other examples might be given, but in the main the reason given by the bank president is applicable—they are not made in sufficient quantities or not of high enough quality to satisfy our requirements. Why should our wool be made into socks, yarn and tweeds on the looms of England? Why should our pulp be made into paper by the workmen in the mills to the south of us? Surely this is money lost to our Province and retarding its development. The question is, what will turn out greater quantities of goods and of higher quality? The answer surely is—"better trained workmen and more of them."

Another point in connection with our exports might be illustrated from the case of fish. As pointed out in our resources, the fishing industry of our Province provides an annual revenue of about two and one-half millions. Also, a great deal of our fish is exported to other countries. The following data would raise the question as to whether we are making the revenue from this industry as great as possible. In the report of the Dominion of Canada Royal Commission on Industrial Training and Technical Education, the Commissioners point out, in Chapter IV., Part III., the need of schools for fishermen. The article reads—"Our fishermen put fish in puncheons to soak in bloody water, and pack weeks afterwards, losing the entire flavor of the fish. They economize by buying a cheap barrel which will not hold pickle. Result—rusty, discolored fish, worth \$6 a barrel instead of \$15.

"A Lunenburg fisherman will wash 1,000 quarts of green fish in the same water, in order to save a few barrels of refuse for fertilizing;—value fifty cents per barrel, total \$2.50; and deteriorate the value of the catch fifty cents per quintal, total \$500—net loss, \$497.50. I can prove the absolute truth of this happening time and time again. The old fishermen refuse to change their antiquated methods; the Government will have to educate the young by training brainy, enthusiastic young men who will devote their time to teaching up-to-date methods to fishermen and their children."

Reports from different sources would tend to prove that the fishermen of our own Province are no more advanced in their methods than those in the examples above. Another case of the need of specific training.

Conclusions from Letter to Manufacturer.—Possibly the first conclusion is reached, not from letters received, but from letters not received. One hundred and twenty letters were sent out and forty-two replies were received. This would, on the face of it, indicate an apathy on the part of the manufacturer to education of this type. Right here, we have revealed one of the places where the problem must be most vigorously attacked. The manufacturer will surely receive a great benefit from an improved quality of work, but the question is, "Can we convince him that this education will improve the work?" His co-operation for a successful solution is absolutely essential, but how to obtain this co-operation is the problem.

We think that, in this connection, a great deal could be done by the daily press. Of course, there are many magazine articles and educational reports which deal with the advantages of this kind of education, but the great majority of the manufacturers would not read these. The man who does read them is interested any way; he is among the forty-two who did take the time to answer. German products are going to the entire world in a great and overwhelming stream. Her sales to the United States, the English colonies, and China, have increased one hundred per cent. in the last decade. Every village in the Fatherland has at least one industrial school, and often in small cities several are to be found. Could not the press be induced to bring details of results in other countries before the public?

What will no doubt do the most to interest the manufacturer will be practical results from schools already established. The action of the Education Department in putting this work in charge of advisory committees, which must be composed partly of manufacturers, will spread its influence.

From another standpoint, the number of replies was very encouraging. In the first place, it does not of necessity follow that the seventy-eight who did not reply are not interested in industrial education. Many other reasons might be assigned. Then, the forty-two who did answer are in all probability the men giving the most thought to the question. In sending out our letters, we tried to send a number to each of the representative industries, and also to the manufacturers on the advisory committees of the different cities. From this, we think that our letters obtained, to some extent, the representative opinion of the industries, as well as the opinions of men who are discussing ways and means for improvement.



Chapter VI.

THE AUTOMATIC WORKER

Our first question to the manufacturer was—What percentage of your employees are engaged in work for which you regard no special preparation as necessary? In thirty of the forty-two letters received definite percentages were given. These ranged all the way from 0 per cent. to 80 per cent., the average being $22\frac{1}{2}$ per cent. If we may be permitted to take these as typical cases, there are 79,650 workers in the manufacturing industry alone, who may be classed as workers of the hand only. When we add to this, the number of this class in the mines, on railroad construction, in lumber camps, and on the various contracts in cities and towns, we find no doubt a large percentage of the total workers of the Province to be of the automatic type.

The cause of this, as far as the manufacturing industries are concerned, has been referred to as a conclusion from our data in table 1, Chapter IV., namely, the increased use of machinery. Back of this is the great industrial development of the last decade, and back of this again the high protective tariff which is in force in our country.

These conditions will no doubt be intensified. In our system of large scale production and extreme division of labor, a large and increasing number of our factory workers will be assigned either to work upon small, monotonous, and more or less automatic tasks, or to serve at specialized machines which contribute a large output in one small process of the manufacture of the article made by the factory.

The result of this type of work is deadening in the extreme. Skilled occupations usually bring into operation the activities of the higher processes of the nervous system. On the other hand, automatic employment calls almost exclusively for those movements which exercise over and over again a few motor centres, but do not stimulate the thinking of the worker. There is also much evidence to show that the wage-earners who are engaged in this kind of work are subject to special temptations during their leisure hours. Fatigued by the strain of their work, they seek relief in exciting experiences, which often lead them into immorality and crime. This condition has become a real social menace in our towns and cities. The frequent press reports of drunken carousals of some group of foreigners, with sometimes a murder as a result, point strongly to the social danger in the midst of us.

There are many difficulties in the way of education for this class. Possibly one of the greatest is the large percentage of foreigners in this division. The following extract from the last census (1911) points to the great increase of immigrants in the Province in the last decade:

	1911	1901	Increase per cent.
British	1,927,099	1,732,144	11.3
Austro-Hungarian	11,771	919	1180.8
Bulgarian and Roumanian....	1,483	38	3802.6
Chinese	2,766	732	277.8
Greek	1,394	65	2060.
Italian	21,265	5,233	306.4
Jew	27,015	5,337	406.1
Polish	10,602	0	.....
Scandinavian	8,250	3,854	114.04

In connection with the above data, it is an acknowledged fact that the majority of the foreigners have a great preference for the city, and also that the outstanding feature of their life in the city is its segregation. Nearly every city has its "little Italy," its Polish quarter, etc. This latter fact makes the assimilation of the foreigner especially difficult.

Another great difficulty is the attitude of a large percentage of the employers towards this kind of labor. Not only are they indifferent to the question of improvement, but in many cases, strongly opposed. They say, "Who will do the menial work? It will mean higher wages for these men." Less than half of the manufacturers who wrote us spoke in this way, but no conclusion could be drawn from this, as it would seem reasonable to conclude that only the employers who were most interested in education took the trouble to answer.

A further obstacle, which is intimately connected with the preceding, is, that without the co-operation of the employer it is almost impossible to reach this class. Their lack of knowledge of our language shuts them off from nearly all educational influences. This feature, coupled with a general lack of initiative, which is not by any means confined to the foreigner, makes the problem one which could be handled very much better by the employer himself.

Notwithstanding these difficulties, we think that the widening social spirit of our times demands that something be done. The number of employers who regard this class of worker as merely a cog in their machinery, and disregard the human and social

elements, is being lessened every day. Any form of vocational training was looked on with distrust a few decades ago. Now, it is regarded as vital to the growth and development of the state. This branch of training is ever taking new forms, and one of these is improvement for the automatic worker.

In our circular letter, we referred to the efforts put forth by the National Cash Register Co., at Dayton, Ohio. Their location, away from the centre of the city, affords special facilities for sport, picnics, etc., which are denied to the ordinary manufacturer. However, the very superior hygienic conditions under which they work could be obtained to a great extent by the manufacturers of our Province. The question of cleanliness alone is of great importance. If the foreigner could be taught even this lesson, it would minimize to a great extent the menace which exists in nearly every foreign quarter. In the matter of light, ventilation, and protection from unhealthy gases, our manufacturer could also make improvements which would very much strengthen the physical make-up of the worker.

On the social side, some manufacturing concerns have athletic associations with baseball, football, basketball, etc. These are very valuable, and should be encouraged by the employers. They give vent to the desire for exciting experiences, as a reaction from the monotonous drudgery of work, and that in a healthy, enjoyable way. Picnics, suppers, and entertainments of a similar character, are also of some benefit if they can be handled so that the worker will regard them as entirely free from selfish motives. The employees are frequently suspicious of the motive, and two large concerns in Toronto told us that they had abandoned the picnics for this reason. Some firms, however, do use them, to the social betterment of the worker, and find that they are much appreciated by the men.

On the educational side, the reading room in connection with the factory can be used to great advantage. It can be utilized as a social club, a place for lectures, and also a room for formal class instruction. The prime essential for the foreigner is the English language, and the social workers from our universities and Young Men's Christian Association would no doubt co-operate with the employer in teaching him. The moving picture could be used for giving information in an attractive form, or in teaching civic and patriotic lessons. Bright talks might be given by employers or educationists dealing with questions of interest to the man as a worker and a citizen, and to the woman as a mother and as a home-maker.

For all of the above agencies for improvement, the firms which have used them to any extent claim that even from an economic point of view they ultimately pay. The loyalty to the firm; the feeling that good treatment demands in return the best effort; the increased efficiency of the worker—are amongst the results which make them even a good financial investment.

With respect to men in lumbering, mining, and railway construction who may be included in this class, the employer can, as in the previous case, do the most towards improvement. The transitory type of this class of worker makes the employer's interest even less than the manufacturer's. The Reading Camp Association has done much to improve the workers in the above industries. During 1912 the Ontario Government gave a grant of \$1,700, as well as a number of boxes of camp school supplies. Mr. Alexander Fitzpatrick, Toronto, who is superintendent of camp education in Canada, reports that during the season of 1913, seventy-one university men, many of them graduates, went out to the camp and joined the ordinary workers in railway construction and other employment. Their close personal touch with the foreigner during the day enabled them to do most effective work in the evening. These foreigners were taught English, and at the same time an attempt was made to inculcate principles of Canadian citizenship.

On the whole, much good work is being done by these influences outside the factory and camp. Social workers from the universities and Young Men's Associations are visiting these men in their boarding houses, arranging classes for teaching the English language, and trying to interest them in Canadian customs and ideals. There is a large field for broadening this work, and the government could wisely expend considerable money for this purpose. Workers of special fitness could be chosen; an energetic advertising campaign, to bring before these people the importance of improvement could be inaugurated, and a wider use of the school buildings could be made. These are some of the cardinal points in the solution of the problem.

Chapter VII.

A SCHOOL FOR WORKERS IN THE MANUFACTURING INDUSTRIES

In proposing some form of education for our second class—those who could be benefited by specific training—we will be guided by two things: first, the opinion of the employer, and, second, the types of schools which have given good results in other countries. Our third question to the manufacturers asked—“What do you regard as the chief defects in those of your employees not included in question 1?” We might here give a few typical answers to this question: The Goldie & McCulloch Co., of Galt—“The men are not taught to think along mechanical lines.” The Dennis Wire & Iron Works, London—“They have been inadequately and irrationally educated, in that they were not trained to take an interest in their future life work and were not prepared for any vocation. When they left school their manual aptitudes had not been developed, and they had no interest in any kind of work.” The Toronto Paper Manufacturing Co.—“The majority of employees are deficient in the general subjects of the public school.” The W. J. Gage Co.—“The great difficulty we have with people coming into our manufacturing department is their lack of general education, and they are, therefore, not able to make good with us.” Warwick Bros. & Rutter.—“The chief defect we find in those who come to us from school is their inefficiency due to lack of primary education. They leave school too early. They are not sufficiently grounded in the elementary subjects.” The John Morrow Screw & Nut Co., Ingersoll.—“Nothing in their education bearing directly on their life work.” The Ives Modern Bedstead Co., of Cornwall—“Elementary education.” The Russell Motor Car Co.—“The majority of our workmen have not had the careful detailed instruction to make them as proficient as they should be.” The George White & Sons Co., London—“The chief defect is that their education has been too academic.” The Wm. Davies Co.—“Those who have had any preparation have not gone far enough.” The Imperial Rattan Co., Stratford—“Lack of incentives, lack of accuracy, lack of opportunity in early years.” The Canadian Carriage Co., Brockville—“The lack of practical education. We have induced the Collegiate Institute here to open night classes, where working boys are given an opportunity to learn English, arithmetic, drawing, woodwork, electricity, and chemistry.”

Other answers on this point might be given, but we think that we have given enough to show two things, first, that a continuance of the general education of the elementary school is desirable, and, second, that whatever type of education be provided it should have an intimate relation with the activities of life.

In connection with our last question—What form of education would you suggest for this latter class?—we were advised by those more familiar with the situation, that the manufacturer might regard this as too general and not bother answering it. To help in this connection, we added a list of the more important types of schools with what we regarded as their chief characteristic. In thirty-five of the forty-two letters received, the manufacturer expressed his opinion of these types.

Regarding the first type—continuation schools—thirty letters spoke in strong approval; in eight cases, it was the only school they recommended. None of the letters raised an objection to the continuation school, and, in some cases, where no form of school was approved, their list of defects would indicate their approval of this type.

The co-operative school was also a strong favorite; ten letters gave this as their choice of types. With regard to apprenticeship schools in shops, only four favored these, and then qualified it by saying it was possible only in large concerns. Only six letters referred to trade schools. Three condemned them, while the other three said that they would turn out the best finished artisan. The latter three mentioned some other school as well as the trade school, so it is difficult to say whether they favored a purely trade school training or not. The last type—higher technical school—was prominent. Fifteen letters, eulogized it as a good school to supplement types 1 and 2.

We feel, then, that as far as the opinion of the manufacturers could be obtained, some school which would supplement the work of the public school, and at the same time have a bearing on the activities of life, would be suitable. This general standard is sought and obtained to a greater or less degree in other countries. The continuation schools of Germany are possibly the most notable example. Details of these schools were given in our résumé. England has some schools which would seem to meet this need; the Preparatory Trade School at Leeds being an example. France has somewhat the same objective point in her complementary courses, while the United States have what is called an intermediate or pre-apprentice trade training which seeks the same ideal. From these two features—the opinion of the manufacturers and its success in other countries—we feel justified in suggesting a school of this type for Ontario.

If we offer any suggestions for a scheme for industrial training, the proposal of the Royal Commission on Industrial and Technical Education of necessity comes to mind. They propose a very comprehensive scheme which has the following units:—

(1) For those who are to continue at school in urban communities. Under which heading there are six different types of school, (2) For those who have gone to work in urban communities. Under which heading there are also six different types; (3) For rural communities. Here eight different types of schools are proposed. While it is somewhat presumptuous to criticize this scheme, yet we venture to ask, has any country started off with all these units? Is such a system workable at the present time? Might we not first develop some standard types that have proved their worth, and proceed to differentiate when the demand arises?

The question when education should take an industrial trend is one on which there is not a uniformity of opinion. That difference of opinion results largely from different interpretations of "industrial trend." Some interpret it as meaning work having a direct connection with industrial operations, while others regard it as starting the pupil at some form of handwork which will develop his constructive instinct and create an interest through self-production. With this latter object in view, we feel that much work of value could be done during the last two years of the public school course. Much valuable work is being done by means of manual training, but we consider that very much greater use could be made of it than is being made. The constructive activity of the child asserts itself from his infancy. If left to his own resources, he builds houses with blocks, caves with sand, etc. Educational theory made a distinct advance when personal sense-perception took the place of abstract ideas. This idea is at the base of the kindergarten and has done much to solve the problem of elementary education.

Viewed from the neurological side, manual activities are of prime importance in the development of the motor area of the cerebral cortex. Manual training, as pointed out by James and Donaldson, requires the co-ordination of eye and hand at the same time; hence it unites the cerebral areas and results in a better organization of brain. Sensory and motor areas must of necessity be associated to bring about a properly-developed brain. Further, manual training should engender a habit of observation, place a value on precision and beget a habit of self-reliance. All of these are basic elements in the making of a good citizen.

We think, therefore, that in the light of the foregoing, the Education Department would be justified in making manual training compulsory in the public schools of the villages, towns

and cities of the Province. In the case of the rural schools, much value would result from introducing manual training, and that need is all the time increasing. The boys of a few decades ago made their own pop guns, bows and arrows, miniature water mills and weather vanes for the barn or woodshed. The jack-knife was their valued tool. With an axe, brace and bit and a few saplings, they made their own sleds. The prevalence of factory toys has done away with most of this, and the value of the whittler is lost to the community. In rural schools, with a single room and but one teacher, the workshop does not yet seem possible. The consolidation movement, however, is spreading, and one feature of these union schools should be a comprehensive course in manual training.

In speaking of this constructive activity of the child, we see different stages. There is the wobbly house of blocks which the child makes and calls a castle. The important feature lies in the fact that to him it is a castle, and it is the work of the teacher not to stress unduly the defects in construction, but rather to encourage the creative ability shown. Later, however, it is the duty of the instructor to emphasize the accuracy of the joints and the slope of the bevel. At one time, the imagination is uppermost, at another the technique is important, and a wise combination of the former with the latter will produce a better article and a better boy.

Following this stage, there is a time when the boy is not interested in making stools or boxes unless they have a direct bearing upon the earning of a living. The principle of imitation, which has been the chief factor in his development up to this time, now takes a new form. He is now anxious to do as men do, and it is natural to conclude that a different type of education is needed. This period functions in the boy about thirteen or fourteen years of age, and corresponds roughly to the time when he leaves the public school. This is also the most impressionable time in the life of a boy. Habits are formed which last a lifetime. If he does not lean to a professional career, and is forced to attend a school which only prepares for such, he wastes his time to a very great extent. The records of many high schools show that if the boy is not educated with reference to this interest in earning a living, he refuses to be educated at all. Finally he leaves the school and takes a job in some manufacturing concern. What is the result? He is one of the employees of whom our manufacturers say—"Their former education had no direct bearing on their life work."

Returning then to the conclusion arrived at after giving extracts from the letters of the manufacturers, we would advocate

a school which would make this instinct to do what men are actually doing in the industries, a central feature. We would then group the subjects of a general education, which we decided as essential, around this instinct. To such a school, we will give the name—supplementary.

Many of the features which we would combine in this school have been mentioned in connection with schools referred to in our résumé. We feel that the subjects usually spoken of as giving general education, could be stressed more than in any of these schools and yet not overburden the course. As we mentioned in our introductory chapter, principles have to be considered as well as facts; otherwise we have a very one-sided education. In giving more attention to these subjects, we do not propose to treat them in the ordinary abstract form. Every subject must be subordinate to the industrial interests of the particular community served. These are the pivot around which all our course must revolve.

Further, these subjects—history, civics, literature, etc., are not stressed because the industrial side is devoid of cultural elements, and they are not introduced for that purpose. We strongly protest against the statement that industrial education is one thing and cultural education is necessarily another. Modern industry is crammed full of the results of human activities, results of constructive mind and mute examples of years of patient devotion. Every complicated machine illustrates the fact that "Art is long and time is fleeting." Can we not build up a course in history, literature, etc., based on these elements, just as cultural as any now in vogue in our high schools, and at the same time contribute much more to the making of an efficient citizen? Is it not as cultural to teach a boy arithmetic applied to the problems of a machine shop, as to teach him to work out of a text book examples which have no special application to the things of life? Is it not cultural to give a boy or girl who has no desire to go through a college an opportunity to learn something which will result in greater efficiency in occupations, and, hence, produce a better state? Nor need the culture of the ancients be lost to the student of industrial education. The desire for artistic form in manufactured articles and the addition of sculpture to architecture is steadily increasing. One of the charms of any piece of sculpture is the story it suggests and the history it unfolds. We gaze, for example, at the figure of the "Dying Gaul." The head is bowed in the last agony. The natural muscular strength of his nude body makes all the deeper the impression of defeat from a power beyond his ability to control. Yet through it all one sees the undying, the undefeated spirit of the man, forcing

his ebbing strength to fight to the last. But again it speaks of progress. It symbolizes the advent of Caesar into Gaul; of civilization by the Romans. Further, there is such a thing as "soul" in statuary. In such a work of art the sculptor has expressed the depth of his own spirit, and it finds a response in the heart of every beholder. Industrial Art is filled with just such examples as these.

With respect to courses for this school, it would be clearly impossible to provide separately for every industry. A study of the table giving the number of employees indicates that work in wood and iron, in their various forms, would cover a large number of the industries. Moreover, those standing highest in that list are engaged in manufacturing these products. In the first fifty on our list, 100,000 workers are engaged in manufacturing establishments which make up wood and iron into various products. We might reasonably suppose, then, that the great majority of schools would have shop work in wood and iron. The building trade would be developed in one place, while the manufacture of furniture would predominate in another. Foundry and machine shop products would be prominent in one town, while plumbing, tinsmithing or sheet metal work would lead in another. As our school is to be distinctly a local affair, it must be ready to provide shop work in any of the industries, wherever the demand arises. Schools in centres like Toronto, Hamilton, Ottawa and London, should have shop work in a large number of the leading industries. Our tables show that the ten leading industries are—woodwork in its various forms; iron work in its various forms; men's and women's clothing; printing, bookbinding and publishing; hosiery and knit goods; bread, biscuit and confectionery; boots and shoes; electrical apparatus and supplies; brick, tile and pottery; leather, tanned and finished. Each of the cities named could provide shop work in such of these as conditions demand. Smaller cities could have, say, half of these, according to their prominence in the district, and so on down to the two mentioned. According to the 1911 census, there are ninety-nine cities and towns in Ontario with over 2,000 inhabitants. Each of these could support at least one supplementary school giving a two-year course.

Primarily, this school is intended to meet the needs of pupils between fourteen and seventeen years of age, but no rigid regulation should be made in this regard. Any age at which the pupil would benefit by the instruction offered would be definite enough. The instinct to earn a living and to imitate the acts of men functions at different ages in different individuals, and their desires along these lines, would be a more valuable entrance requirement than any fixed age limit.

In giving some headings for a course in this school, we will begin with those subjects of a more general nature, which will of necessity be in all the schools.*

CIVICS—

First Year:—Such topics as the following might be developed

—The city or town council, how elected, its duties; the different units in enforcing the laws of a city or town; the duties of a magistrate, constable, etc.; why the need of all these officers; chief causes of law breaking, including legalized causes, why these latter?

Township government; its object; how elected; its officers.

County government; its function; county judge; registrar; clerk, etc

Provincial government; how elected; cabinet system; duties distinctively provincial; education, higher, secondary, and primary; educational organization in township, village, town, and city; direct taxation.

The Federal government; its constitution, cabinet; different ministers; their duties; duties of Federal contrasted with those of Provincial governments; the senate; how appointed; its function and value; the law courts; judges.

Second Year:—A review of the main headings of the previous year; indirect taxation; old age pensions; government annuities; the community organization in a general sense; its social and economical structure; the constitution of the state; different kinds—democratic, despotic, republic, constitutional, examples of each; legislation and the promotion of justice; security of property, etc.

Just as the foregoing, were introduced to acquaint the student with rational principles of conduct for mind, so we would introduce deportment and hygiene to do the same for the body. The following topics could be treated in connection with physical exercise:—

DEPORTMENT—

First Year:—Behaviour, in and out of the house, in school, in the workshop, towards customers, and in social gatherings.

*In connection with the following course, we received assistance from a number of the teachers at the Toronto Technical School, and also from the calendars of similar schools in the United States, Germany, and England.

HYGIENE—

Second Year:—The construction of the human body; nourishment; food and food luxuries; respiration; circulation of the blood; care of the skin and teeth; the dwelling-house and clothing; trade influences injurious to health, more especially the effects of dust and gases; first aid to the injured.

COMPOSITION—

First Year:—Short exercises in original creative work; a study of some good models of narration, description, and exposition; sentence and paragraph structure; punctuation; spelling; short essays on tools, articles made in the shop, and on everyday scientific apparatus. (a) Letter-writing—offer of service; inquiries and replies; applications for positions; statement of acceptance and declination. (b) Oral composition—subjects of pupils' own choosing; work in the shop; everyday topics; modern appliances which make for comfort and convenience.

Second Year:—Work of first year continued; greater attention to literary style and different methods of expression; letter-writing extended to include correspondence with officials, drafting of tenders and bids; oral composition to take the form of debates on social and political questions of the day.

LITERATURE—

First Year:—A careful study of the following—The Talisman; The Lady of the Lake; Ivanhoe; Silas Marner; Irving's Sketch Book; memorization of choice passages from the above.

Second Year:—Tam O'Shanter; The Deserted Village; The Prisoner of Chillon; The Ancient Mariner; Julius Caesar; Merchant of Venice; Tale of Two Cities.

HISTORY—The history will have two parts—general history and trade history.

First Year:—The development of Canada; Quebec Act; Constitutional Act; Act of Union; British North America Act; current events both at home and abroad; the development of commerce; its basic principles; incentives to trade; the

development of the woodworking trades; architectural plans and processes; the machine trade from the various standpoints.

Second Year:—Outlines of British history, with details of recent important legislation; the relation of the colonies to the British Empire; importance of trade and commerce in modern times, and its importance to the welfare of the citizen; a study of our great English and American writers on industrial topics. The supplementary reading in the library will include much that is best in invention, discovery, manufacture, distribution, and the attendant industrial and labor problems.

GEOGRAPHY—

First Year:—The resources of Canada; where found; their uses; the chief exports and imports; the Provinces of Canada, their industrial features; the weather and climatic conditions of the various provinces, together with the causes which govern these conditions; a study of the industries with respect to climatic conditions; the rail and water routes of the Dominion, their importance to trade; the location and growth of the cities and the reasons therefor; a general idea of other countries with respect to climate, production, chief cities, etc.; the chief harbors of the world, ocean routes, etc.

The foregoing subjects would, in the main, be taken by all students, irrespective of what industry they proposed to enter. With respect to the remaining subjects—mathematics, physics, chemistry, drawing, and shop work—they would have a more specific bearing on the particular industry studied.

ARITHMETIC—

First Year:—Common fractions: explanation of fractions; reduction; fundamental operations; cancellation; practical problems.

Money and decimals: wage calculations; wage systems; decimal equivalents of common fractions; fundamental operations; percentage.

Second Year:—Ratio and proportion: simple ratio: proportion: problems from physics and chemistry to illustrate.

MENSURATION—

First Year:—Square root; triangle; trapezium; circle; sector; speeds of pulleys, belts, emery wheels, etc.; estimates for brick work, stone work, lumber, lath, shingles, plastering, paneling, papering, flooring, carpentering, etc.

Second Year:—Areas of geometrical figures continued from first year; surfaces and volumes of prisms, cylinders, pyramids, cones, frustums, and spheres; flow through pipes; application of Simpson's rule; use of tables; principles of simple machines; types of simple levers; the wheel and axle; pulleys; the inclined plane; easy problems on above.

COMMERCIAL ARITHMETIC—

First Year:—Profit and loss; interest; taxes; insurance, etc.

Second Year:—More difficult problems on the topics of the first year; compound interest; duties and customs; partnerships; etc.

GEOMETRY—

First Year:—Use of compass, protractor, and scale; careful construction of different kinds of triangles and quadrilaterals; an inductive proof of the leading propositions in synthetic geometry with emphasis on accuracy and repeated examination; special attention to areas of triangles, quadrilaterals and polygons.

Second Year:—Induction and deduction contrasted; deductive proof of the leading propositions dealing with triangle, parallel lines, loci, relation between rectangle and parallelogram, between parallelogram and triangle; leading propositions on the circle.

ALGEBRA—

First Year:—Algebra as a generalized arithmetic; powers, coefficients; like and unlike terms; the four fundamental operations; simple brackets; extensive practice in evaluating expressions by substituting numerical values, the simpler formulae in mechanics being used for the purpose; examination of type forms and possible operations with them; simple equations; extensive practice on problems in simple equations.

Second Year:—Equations of two and three unknowns; problems on same; most important types of factoring; elementary treatment of surds and indices; simple quadratic;

graphs; extensive practice in graphical representation of conditions: scientific, political, financial, and social; use of graphs to find the law of a machine.

TRIGONOMETRY—

Second Year:—The trigonometrical ratios; laying out angles; measuring angles; shop uses of the tangent, with applications to gear cuttings; use of trigonometrical tables; calculating heights and distances; tapers and taper turning; dimensions of various screw threads; principle of logarithms; their application.

PHYSICS—

First Year:—Units of weights and measurements (Metric and English); properties of different forms of matter, (a) solids, (b) liquids, (c) gases; relative densities of substances included under (a) and (b) and methods of determination of the same; how the above properties of materials determine their commercial use; molecular theory of matter; laws of cohesion, adhesion, capillarity and surface tension; pressure beneath the surface of fluids, due to their weight and relation of above facts to natural results of the same; elementary heat, thermometry; effects of heat on matter in general, and heat reactions when change of state takes place in matter; practical application of above in refrigeration and atmospheric conditions.

Second Year:—Matter in motion; acceleration, energy, force, work and power; forces acting on bodies on horizontal and on inclined planes (neglecting friction); horse power of steam and gas engines and of water falls; kinetic energy of bodies in motion as applied to pile drivers, etc.; study of laws of friction and their application to finding efficiency of screws, block and tackle; principle of moments, and practical application of the same in determining division of loads in wall and abutments.

Elementary electricity and magnetism—primary cells; Ohm's Law; calculation of size, resistance and number of wires used for house-lighting; electric work and power; elementary knowledge of ammeter, voltmeter, wattmeter, and dynamo.

CHEMISTRY—

First Year:—Lecture work—matter and energy; changes which matter undergoes; elementary substances, mechani-

cal mixtures, solutions and chemical compound; study of oxygen, hydrogen, nitrogen, chlorine and carbon; water, its occurrence, properties, etc.; acids, bases, salts and neutralization; nomenclature of acids, bases and salts; laws of chemical combination; the atmosphere, its nature, composition, essential constituents, etc.; simple problems based on the chemical equation.

Laboratory work—study of changes in matter; study of mechanical mixture, solutions and chemical compounds; study of chemical processes—solution, precipitation, filtration, washing, etc.; study of the principal elements and compounds discussed in the lecture; use of the balance.

Second Year:—(For woodworkers)—Review of oxidation: decay as slow oxidation caused by bacterial action; influences which assist decay; prevention of decay by the use of antiseptics, stains, varnishes and paints; nature, preparation and application of the above.

(For iron workers)—Action of oxygen, moisture, and carbon dioxide on the various metals of importance; methods of protecting the surface by tinning, galvanizing and plating, or by forming on their surfaces thin coatings of oxide, carbonate or sulphide; production of decorative work on metals by plating, or the use of various chemicals. In each case experimental work by the student.

MECHANICAL DRAWING—

First Year:—Use of instruments, lettering, geometric constructions; orthographic projections; intersections; development of surfaces; sketching; tracing and blue printing; use of the scale; working drawings of simple architectural and machine parts to full size and scale.

Second Year:—(For workers in iron)—Isometric projection; machine details, such as rivets, bolts, nuts, screws, cams, keys, pipe-fittings, bearings, couplings, gears; assembly drawings; working drawings of objects being constructed in the shop; tracing and blue printing.

Second Year:—(For workers in wood)—Isometric projection; architectural details, such as joinery, doors, windows, cornices, stairs, framing, plumbing details, foundations, masonry and brickwork; plans, elevations, and sections of simple structure.

FREEHAND DRAWING—

First Year:—A course for the development of the personal powers involved, such as—correct seeing, selection, proportion, etc.; plain and ornate lettering; sketching in freehand perspective of simple objects, singly and in groups; sketching of natural forms in leaves and flowers and their conventionalization; simple design as applied to the work being done in the shop.

Second Year:—(For both wood and iron workers)—Application of work of first year to design to be constructed in the shop; rendering in pencil, ink, and wash; sketching from the school window of landscape.

With respect to shop work, we might first speak of wood-working. The term manual training which we used in the public school, might now be abandoned, as we feel that the conditions have changed. In the elementary school, no direct bearing on any particular vocation was sought. Now, we are basing an education on the desire to earn a living, and at this stage boys wish to do as men do. The first has been predetermined by the school men of the past, and is a matter of tradition; the second must have for its course the conditions which to some extent prevail in the modern workshop. Further, from a standpoint of interest, which is so important in education, a change from the manual training of the public school is desirable. The boy is not interested in making over again the models of the public school, but wants to work on something which men are actually constructing in the factory. We fail to see why the same psychological and moral values, which we emphasized in connection with the earlier work, would not be present, although the subject has now a definite vocational trend.

In the shop, then, we will assume that the two years in the public school has made the boy reasonably handy with tools, and will allow him to proceed at once to make such articles as drawing boards, kindergarten tables, lunch room tables, bulletin boards, simple laboratory apparatus, etc. These could be used in the school, and supplied to other vocational centres. Those more interested in the carpentry side might find additional work in improvements around the school. The placing of door and window frames and the hanging of doors and windows might be done by the pupils. A section of wall, including corners, could be finished inside and out, with necessary inside trim, and with clap-board or other finish outside.

We will not attempt to divide this into years, as no definite line can be drawn. One boy will be a much better workman at the end of one year than another at the end of two years, and we see no reason why the former should be limited to just so many articles.

At convenient times throughout the work, short talks should be given on materials pertaining to the structure of wood, methods of converting trees into lumber, seasoning, characteristics of good timber, defects, methods of preserving lumber, causes of warping, purposes for which special woods are best adapted.

MACHINE SHOP PRACTICE—

Second Year:—In bench and vise work—filing, scraping, some clipping, polishing, etc. In connection with machines, an investigation of the general features of each machine; the care of machines; a study of their needs for successful and rapid operation; a study of possible breakages with their repair; a series of illustrations with the object of introducing the principal processes, as plain turning, facing, boring, threading, etc.; work on planer, shaper, drill presses, or such machines as equipment afforded.

FORGE WORK—

Second Year:—(An alternative course)—Instruction in the mechanism and care of the forge, operation and handling of fire, heating, drawing, bending, upsetting, heading, welding, punching, rivetting, drilling, etc

PATTERN MAKING—

Second Year:—(An alternative course)—Instruction and practice in the making of patterns for iron and brass castings; allowance for draft, shrinkage, finish, etc. Use and making of core boxes.

Chapter VIII.

THE GIRLS' DEPARTMENT

This supplementary school must of necessity have a girls' department. Society is providing more and more completely the means whereby the man may be adequately prepared to fill his place in the world, but is not paying nearly as much attention to the problem of preparing the woman for her place as the chief factor in the making of a home.

The home is one of the most important factors in shaping our future citizens. Here habits are formed which last a life time. The ethical principles of home are the most lasting standards; the artistic order of the parents' home is copied in our later dwellings; the principles of economy practised by our parents have a life-long influence. And so through every activity of life the early training is interwoven. How important is it, then, that those who have most to do with the making of the home should be thoroughly equipped with the most modern, scientific methods of management. If the girl's mother possesses the necessary knowledge of these different departments mentioned above and has the necessary skill and time to teach her daughter, well and good. In very few homes in this Province, however, do these conditions exist, and consequently few girls are getting the training so essential for the success and happiness of themselves and others.

In considering the education of the home-maker and what courses would meet the need, a wide field is presented. We will only attempt a general plan. The following classification would appear to cover the field:—(1) The home itself—a shelter for the family. (2) Food study—the nutrition of the family. (3) Sewing clothing for the family. (4) Home nursing—caring for dependent members of the family. (5) Social and ethical relations of the members of the family to one another and to other members of society.

(1) THE HOUSE—

Under this heading, we could make the following divisions: a) house sanitation; (b) house decoration and furnishing; (c) house management.

(a) **House Sanitation:**—The location, planning, care, ventilation, heating, etc., have their sources in the sciences of physics, chemistry, drawing, and bacteriology. (Some headings with respect to these courses will follow general outline.)

(b) **House Decoration and Furnishing:**—The question of artistic and harmonious environment is one that should receive attention in any home-making course. This would necessitate the introduction of courses in design, color, house-planning, decoration and furnishing.

(c) **House Management:**—A course in the practical side of this division would be difficult to arrange in the school. Much, however, could be done by a study of the various problems of marketing, the proper apportioning of the income among the different lines of home expenditure, the keeping of household accounts, the question of domestic service, the organization and division of labor in the household, etc. A course in commercial arithmetic with its application to many phases of the above would be a necessary correlative.

(2) **FOOD STUDY AND PREPARATION—**

This problem properly solved means perfect nutrition and vigorous physical development. Also, the question of how to provide the best possible food with the means at hand, is a very important one with most people. The sciences to be considered in this connection are chemistry, biology, physiology and dietetics. The practical application would deal with the selection and care of good materials, the preparation and the serving of food. The preparation would include the various phases of cooking, with special attention to invalid cooking. Serving would deal not only with the ordinary meals, but also with meals of ceremony and entertainment.

(3) **SEWING—**

The selection of suitable materials; ability to judge their real value; ability to make or direct the making of the common household articles of use and the clothing of the family; a knowledge of the comparative cost and durability of the different fabrics; the care of clothing when not in use; the various branches of fancy work and its relation to the artistic home; millinery, making of shapes and covering of same, etc.

(4) **HOME NURSING AND METHODS OF DEALING WITH EMERGENCIES—**

A study of child nutrition; the hygiene of childhood; the consideration of infant diseases, and emergencies; child psychology; general knowledge of child literature; a knowledge of simple maladies that may be treated at home; the care of the sick-room; use of antiseptics, disinfectants and deodorants; instruction in first aid for cuts, burns, etc.

(5) SOCIAL AND ETHICAL RELATIONS OF THE MEMBERS OF THE FAMILY TO ONE ANOTHER AND TO OTHER MEMBERS OF SOCIETY—

Such topics as the following might introduce some of the main points:—

The evolution of the home and the family community; the humanizing effects of home functions upon the character of men and women; woman's industrial relation to the home; woman's industrial relation to the community outside the home; the servant problem; the rights of the purchaser; principles to guide the purchaser.

Under this heading would come the work in English which would be in the main the same as for the course previously outlined for the boys' school.

In the subjects previously referred to we might offer some headings:—

Biology:—The influence of plant and animal life on food material; the production and storage of food material in plant and animal tissue; bacteriology in its relation to food preservation and to the preservation of health; study of physical and chemical changes induced in food products by the growth of moulds, yeasts, etc.; a study of bacteria in their relation to disease.

Physiology:—The uses of food materials in the body—digestion, assimilation, storage of energy, etc.; the influence of hygienic living upon physical well-being; an application of the principles of physiology and hygiene to the physical improvement of the members of the family.

Physics:—The fundamental phenomena of physics; properties of matter; energy; molecular phenomena in liquids; cohesion; adhesion; surface tension; capillarity; pressure in fluids; diffusion; Pascal's principle; density; specific gravity; Archimedes' principle; pressure of the atmosphere; heat; thermometry; temperature; change of state; light and electricity; attention to the solving of practical problems and the application of physics in physiology, sanitation, cooking, lighting, heating, washing, and the various household operations.

Chemistry:—Lecture Work (Inorganic)—Matter and energy; changes which matter undergoes; elementary substances; mechanical mixtures, solutions and chemical compounds; the following elements with their principal compounds—oxygen, hydrogen, nitrogen, chlorine, and carbon; water, its occurrence, pro-

perties, temporary and permanent hardness, removal of hardness, drinking waters, sources of defilement, detection of impurities, means of purification; acids, bases, salts, and neutralization; nomenclature of acids, bases, and salts; laws of chemical combination; atmosphere, its composition, essential and non-essential constituents, recognition of each essential constituent; ventilation; bleaching agents—ozone, hydrogen peroxide, bleaching powder, and sulphur dioxide; baking powder—composition and use.

Lecture Work (Organic)—Elementary organic; special study of the carbo-hydrates, fermentation, fats, soaps, and proteids; action of saliva, gastric and pancreatic juices on the various foods; removal of stains; problems based on the chemical equation.

Laboratory Work—Changes in matter; mechanical mixtures, solutions, and chemical compounds; study of chemical processes—solution, precipitation, filtration, washing, evaporation, and crystallization; a study of the principal elements and compounds discussed in the lectures; use of the balance.

Dietetics:—A study based on chemistry, biology and physiology in which is considered—the suiting of food substances to the requirements of the body in health and disease; the influence of age, climate and occupation upon the kind and amount of food used, and upon its manner of presentation; practical application of this in the planning of dietaries suited to different conditions, the actual weighing, preparing and serving, etc.

Freehand Drawing:—A course for the development of the personal powers involved, such as, correct seeing, selection, proportion, etc.: plain and ornate lettering; sketching in freehand perspective of simple objects, singly and in groups; sketching of natural forms in leaves, flowers, etc., and their application to design in pottery, embroidery, stencilling, etc.; sketching of landscape from the school window.

Another type of training, however, will have to be provided. Assuming that woman has settled upon her "rights" and that she is prepared to enter the field of the world's work, it is necessary to think of her preparation for this work. The same forces which are asserting her right to vote, to work, and to hold property, must attack the problem of vocational training for women. That there is some demand for specialized training is borne out by the following figures:—In 1901 there were 29,591 women engaged in the industries of Ontario. This number increased during

the decade to 40,545 in 1911. The following are the leading industries which employ female help:—

Clothing, women's, factory.....	6,139
Hosiery and knit goods.....	3,062
Clothing, men's, factory.....	2,692
Fruit and vegetable canning.....	2,379
Clothing, women's, costume.....	2,142
Bread, biscuits and confectionery.....	2,114
Printing and bookbinding.....	1,593

Data is not available as to how these are distributed throughout the Province, but as our schools must be distinctly local in character, each could include such elements as conditions demand.

Our school for girls, then, could have a general course for all in the first year, along the lines suggested in home-making. In the second year, it could have two divisions—one continuing the home-making course, and the other devoted to a training in preparation for the industries of the district which required female workers.



Chapter IX.

A CO-OPERATIVE SCHOOL

There is a form of training which might be regarded as taking a middle ground between the apprenticeship system and the trade school. In the former, there is a measure of practical and theoretical instruction in the industrial establishment, under the direction of the industrial manager. In the latter, the whole scheme is provided for in an independent trade school, which is largely under school management. The middle ground is represented by a co-operative effort which delegates the practical trade training to the manufacturer, and the theoretical instruction to the school authorities. This would give the pupil what neither the trade school nor the apprenticeship system could furnish, and that is, a general training in the theory of his trade as well as the elements of general culture.

If the co-operation of the manufacturers could be secured, this is no doubt an ideal scheme. In the first place, it would relieve the school to some extent of the shop side, which is the most expensive and the most difficult to arrange. Machines become out of date very quickly, and all that the school could hope to do is to teach principles from typical machines. It could not attempt to have all the special machinery to turn out the separate parts of each article, or the expense would be enormous. In the second place, under the co-operative plan, the pupil is working in actual commercially-operated plants. The hum of industry is on every hand. Push and stamina are necessary to hold one's place in the shop organization. The pupil learns the value of promptness in a way hard to enforce in the school, and becomes accustomed to the actual conditions under which he will later spend most of his time. A third feature that we might mention, is the fact that the paying for the work makes the indenture feature, which is so objectionable in the apprenticeship system, unnecessary.

In our sketch of the United States system, we made reference to a number of cases where this plan is in operation. Much has been said about the success of the Fitchburg plan, which we might mention in more detail. The course outlined is of four years' duration, the same as the regular course in the Fitchburg High School. The first year is spent wholly in school, and the next three years alternate weekly between the shop and the school. The manufacturers take the boys in pairs, so that by alternating they have one of the groups at work, while the other group is at school. Each Saturday morning the boy who has been at school that week goes to the shop in order to get hold of the job his mate is working on, and be ready to take it up on Monday morn-

ing when the shop boy goes into school for the week. Boys receive pay for the weeks they are at work. For the first year, ten cents an hour; the second year, eleven cents an hour; and the third year, twelve and a half cents an hour. Every candidate is given a trial period of two months, beginning immediately at the close of school in June. This gives the boy a chance to find himself, and is a most valuable type of vocational guidance. The director of the industrial department in this school claims that these classes have no difficulty in keeping up their social standing with the rest of the school.

Another type of co-operative course is that furnished by the Lewis Institute, Chicago. The same plan of alternate weeks is used as in the Fitchburg plan, and a somewhat similar scale of pay. The course is, however, only a two-year one, and covers not only the theoretical side of the work as above, but also gives practical training in the trades. The courses offered include—machine shop practice, foundry work, forge work, pattern making, and kindred subjects. While this course was designed primarily for those who were obliged to enter the industries as apprentices, it is now open to any who can show fitness for the work.

Our supplementary school for the manufacturing industries might be utilized to give a co-operative course to those who are obliged to go to work on completion of the public school course. The alternate week plan seems to have worked out very satisfactorily in the cases we have cited, and we see no reason why it would not do so in our larger towns and cities. As the pupil is only in school half his time, our two-year course would have to be extended to four years. The same courses which we outlined could be followed, attempting only half of the work there suggested in any one year.

An alternate plan would be to reduce the amount of shop practice on account of the student being actively engaged in that work when not in school, and arranging the rest of the work into a three-years' course.

We recognize that serious difficulties stand in the way of any such plan as the above. On the one side, we do not think that as yet the manufacturer is sufficiently sympathetic to the whole movement of industrial training to agree to the plan. On the other hand, it would require almost entirely a separate unit in the school to provide for this class of student. They could not be handled on the same time-table as the regular pupil. In the larger cities, however, this latter difficulty could be easily overcome, owing to the larger staff and greater variety of courses. If the manufacturers' co-operation could be gained, we think that the other difficulties could be overcome, and the plan would undoubtedly prove very valuable.

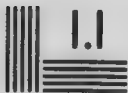


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Chapter X.

AGRICULTURAL EDUCATION

One of the most serious problems confronting the Province of Ontario is that of maintaining the equilibrium of population between rural and urban life. Serious, in that it involves the kindred problem—the maintenance of the equilibrium between food production and food consumption. A reference to our table shows that out of a total population of 2,182,847 in 1901, the rural districts accounted for 1,246,969, while in 1911, out of a total of 2,523,274, only 1,194,785 were classed as rural.

The question of what can be done to keep the boy on the farm is one that is now receiving considerable attention. There is an unnatural glamour accompanying the securing of a position behind a counter that does not exist in a job secured on the farm, where the boy follows the plough and milks the cows. It is to our mind largely a social question. The idea, "Oh! he is a farmer," suggests to a great many people a being not specially strong intellectually, and capable only of physical toil. While in the majority of cases the farmer is better versed in the real elements of culture than the city individual who thus speaks disparagingly of him, yet a more intensive form of agricultural education and rural uplift would do much to raise his social status.

Again, agriculture in Ontario is to-day in a period of evolution. Many of us remember the rural Ontario of yesterday; the thickly populated rural communities; the average hundred-acre farm supporting through the winter twenty or thirty head of beef cattle; the well-filled rural schools; and the busy villages. Then came the change. The opening up of the "Great West," and the industrial growth of our cities unmanned our farms. Those left found themselves unable to till land enough to produce fodder for the stock. Instead of twenty or thirty head of cattle, the farmer wintered about three or four. Sheep husbandry was almost abandoned. What is the result of all this? In the case of the cattle, the above condition, coupled with the revision of the American tariff, has cleaned out almost all the cattle from the Province. Other stock is equally scarce. A near meat famine is the result. Conditions such as these will no doubt work a change in methods of farming, and place a premium on the scientific breeding and feeding of stock.

Further, these great urban centres require such immense quantities of produce that farming in Ontario must of necessity

become more a matter of science. The dairy, the raising of poultry, the vegetable garden, the fruit orchards, must all be treated from a more scientific standpoint if production commensurate with demand is to be maintained.

Another feature which calls for recognition might be mentioned. The paring bee and the singing school have become a thing of the past. Now, the Farmers' Clubs and local Literary Societies are taking their place, and the Women's Institutes are spreading to every part of the Province. The telephone, the rural mail delivery, the extension of good roads, the proximity of electrical energy, have all come to the farmer in recent years. To obtain the greatest returns from all these agencies, what must the farmer have?

Illustrations bearing on the need of better rural education might be multiplied, but we think that the above are sufficient to show that a knowledge of the "why" is becoming as important as a knowledge of the "how." The father of to-day may be fairly competent in the old type of farming, but be quite incompetent to convey to his son the scientific principles and practices on which the new and successful type of agriculture must rest. The tillage of the soil, the selection of seed, the rotation of crops, the destruction of insect pests, the harvesting and curing of various products, the feeding of stock, the packing and marketing of products—all these involve more and more a type of scientific insight and training which can be acquired only under special conditions of education. The home has not necessarily become less efficient, but the demands of modern life, as illustrated above, are such that it can no longer meet the modern need for education.

With respect to the present provision for agricultural education, we gave the main units of the system in Chapter III. Considered collectively, much better provision is made for training in this industry than in the manufacturing industries. Nature study has been in operation in the public schools since 1904. Dealing as it does with soil, weather, plants, and animals, it is distinctively agricultural. The school-garden movement is also growing. While in 1910 only fifteen schools qualified for the special grant for school gardens, in 1911 there were thirty-three. In the year 1913 over one hundred schools signified their intention of making use of the school garden.

From the very satisfactory results that have attended its use both here and in other countries, the Department might consider the advisability of introducing it into all the rural schools. There is a danger that the nature study is made too theoretical, and the school garden will help to correct this. It is along the line of

giving outlet to the constructive activities of the child, as well as teaching him something of practical value. It can be made the basis of nearly all the other work of the school. For example, the arithmetic can be built up around measurement in the garden, sale of produce, etc.; the composition can treat of laying out the garden, some plants, kinds of soil, etc.; the geography can deal with the district, influence of winds, weather, etc.

Interesting results are available from other countries, and also from a few schools in our own Province where the school garden idea has been extended to what might be called a co-operative plan between home and school. Instead of the boy having a plot in the school garden, he has a plot at home. For example, in connection with the growing of potatoes for the farm, the boy takes a small section of the field, say one-eighth of an acre. He receives counsel from the teacher as to selection of seed, time and method of planting, time of spraying, etc. An account is kept of all this, ending with the exact yield of the plot and a comparison with the rest of the field. These records are brought to school and gone over with the class. Comparisons are made with the records of other members of the class who have tried a different variety, different time of spraying, etc. Various experiments of this kind could be worked, such as poultry raising, bee-keeping, vegetable growing. A list of these tests, and where conducted, could be kept and much encouragement given by visits from the teachers and district representatives.

Similar work might be done by the girls along the line of flower gardens, sewing, cooking, and other ordinary household duties. The girl's mother could sign specially prepared forms certifying to the work done. In the household-science work of the school proper, these results could be dealt with and methods of improvement demonstrated.

No doubt many of the residents of the district could be induced to give prizes for the best results in the work of both the boys and girls.

Details of results in other countries indicate that we are justified in proposing a supplementary course in agriculture, to follow the elementary school, along similar lines to that proposed for the manufacturing industries. We have agricultural courses in our high schools, but up to the present very few have taken advantage of them. We think that much of this is due to the fact that the high schools are not closely identified with the community and its affairs. It still carries the old idea of something for the favored few, and existing only for the professions. Again, the social question, referred to in the early part of the chapter, would tend to keep students out of the agricultural course. In

speaking of the supplementary school for artisans, we thought it feasible in places of over two thousand inhabitants. These places are almost invariably the centres of agricultural districts, so, leaving out the larger cities, the schools of the preceding chapter might quite properly have an agricultural department. Besides, some villages which have no school for the manufacturing industries, but represent a large farming area, might have schools devoted exclusively to agriculture.

The co-operative plan referred to for the elementary schools would doubtless be the best plan for these schools. We would suggest that fifty per cent. of the time, holidays included, be devoted to home projects, thirty per cent. to school work, dealing with the theory of these projects, and the remaining twenty per cent. to such subjects as English, civics, arithmetic, etc. This school might quite properly be closed for four months in the summer, as far as theoretical work is concerned. To counter-balance this, greater attention could be paid to practical work during these months.

The degree of success would depend in a large part upon how much the school would get from the community, and how much it would give in return. It must of necessity stand for efficiency and progress and through the officers and teachers take the initiative in movements towards community welfare. The keynote of rural uplift and more scientific farming is to interest the farmer. We have attended meetings addressed by representatives of the agricultural societies where five or six would turn out. The school would have to try to remedy this. The co-operation of the farmer must be studied and enlisted. This can best be done by showing results. Each school should have a field in connection with it. The work done in it must be according to the most approved methods. Pupils of the school will be conducting other experiments at home under school direction. Upon the results of these experiments, at home and at school, will depend the interest taken by the community. Reports from schools of this type in operation in the United States, indicate that the farmers are almost without exception willing to assist with materials and advice.

While it is highly important that the farming operations should be profitable, this is not enough. It is necessary that rural life should be interesting and satisfying to young people. This school could be made the home of the literary society. The debates could be along lines of interest and profit to the farmer. A series of lectures by professors from universities and agricultural colleges would raise the tone of the institution, and at the same time prove very profitable.

We think that the following course would work out to advantage in this school:—

FRUIT AND VEGETABLE GROWING—

First Year:—The most approved principles and practices in gardening work; practical work in the school and garden, hot-beds, forcing-houses, their construction and manipulation; methods of cultivating and managing vegetable crops. In the school laboratory specimens of the various products of the garden might be studied as to vitality, power of germination, etc.

Second Year:—A continuation of the work of the first year; principles of fertilizing, pruning, and grafting trees; practical work in same in the neighborhood; laying out of vegetable beds; study of kinds suited to locality; insect pests in fruit and vegetables, their destruction; home experiments to determine the relative value of different forms of cultivating and spraying; the returns from different kinds of fruit.

POULTRY—

First Year only:—The most approved methods of raising, feeding, and managing fowl for breeding purposes and for the market; selection of breeds for laying; marketing of eggs; incubators; poultry houses.

FIELD CROPS—

First Year:—Soils; how to adapt grains and forage plants to soils under varying conditions of climate, moisture, etc.; characteristics of good seed; different methods of cultivation, draining; laboratory study of seed, root, stem, leaves, and their functions.

Second Year:—Grading and judging of grains and grasses; study of common weeds and insects; cause and remedy of rust, mildew; practical tests of spraying; home experiments to test all previous work.

CARPENTRY—

First Year:—A course might be given in the sharpening and handling of tools; making gates, tables, trestles, window screens, hot-beds, etc.

BLACKSMITHING—

First Year:—Building fire; different grades of coal; drawing out, welding, threading, and such work as would be necessary to meet breakdowns in farm machinery.

In connection with a continuance of the first-year work in carpentry and blacksmithing, a course on the ordinary farm implements, their use, mechanism and repairs might be taken.

DAIRYING—

Second Year only:—Study of milk; the various methods of testing for butterfat; the various tests for preservation; use of thermometer and lactometer; how to detect adulterations; cream separators; conditions for ripening and churning of cream; salting and packing of butter; marketing of products; types of cattle suitable for dairying; tests for diseases, etc.

LIVE STOCK—

Second Year only:—Selection of stock; breeding; feeding and caring for stock; a study of the various kinds of fodder, their special value, relative cost; animal organism in its relation to breeding and nutrition.

FARM MANAGEMENT—

Second Year only:—The general features of farm management; the economic side of the various elements of the rest of the course; the executive work in the dairy, in fruit growing, in live stock, etc.; various schemes of rotation of crops, of drainage, of laying out roads, and fences. This course could include special departments for the stock man, fruit farmer and dairy farmer.

CHEMISTRY—

First Year:—Elementary chemistry, as given for first-year students in course of Chapter V.

Second Year:—(a) Elementary soil-chemistry—chief constituents of soils; constituents which are essential to plant growth; simple qualitative tests for the essential constituents; supplying of essential constituents to the soil; the kinds of fertilizers and methods of applying them.

(b) Water supply—Sources of water supply; action of soil filtration on water; sources of contamination; methods of preventing contamination; simple tests for hardness, ammonia, and organic matter, and the significance of each; purification of water.

(c) Insecticides—varieties, composition, time and method of application.

(d) Food—the essential constituents of foods; distribution of the constituents in grain, vegetables, and fodder; consideration of properly balanced stock rations.

DRAWING—

First Year:—The ordinary elements of drawing; flat and relief work; shading; lettering; outdoor sketching; perspective.

Second Year:—A continuance of the above; plans for silos, sheds, barns, stone and cement structure.

ARITHMETIC—

We will not attempt to divide this into years, as the work should grow out of the other branches of the course. There is abundant material for mensuration in the measurement of land, the laying out of fences, the buying of material for fences, buildings, the making of farm utensils in the wood shop and blacksmith shop. Commercial arithmetic could find material in cost of materials, percentage increase, marketing of products, partnership, etc.

With regard to civics and the English subjects, the courses previously outlined in Chapter V. could be followed.



Chapter XI.

EVENING SCHOOLS

Taking the question of industrial education as a whole, the evening schools no doubt reach the greatest number of pupils. Industrial education in every country had its start in the evening school, and for that reason, if for no other, it might be regarded as one of the main pillars of the system. England's effort, so far, has been confined very largely to the evening school, and it has also a very prominent place in the systems of France and the United States. In Ontario, out of some twenty-five towns or cities offering industrial training, only six—Toronto, Hamilton, Brantford, Sault Ste. Marie, Sudbury and Haileybury—have day classes.

Evening classes have many advantages which are not open to the day school previously referred to—they give an opportunity to combine the practice of the day with the theory of the evening; they permit the wage-earner to improve his educational standing without loss of wages; they permit the student to specialize in the particular subject or subjects he wants; and these advantages are open to all at a minimum of cost.

There are also some disadvantages associated with the evening school, which cannot be ignored. In these schools, as a rule, tired teachers instruct exhausted pupils. This has, no doubt, an injurious effect on both mind and body. When school opens in the fall, there is a great rush of eager students. They register, in many cases, for double courses, and start off to devour the whole field. But what percentage of these write on examination in the spring? This varies with different courses, but taking the situation as a whole, there is a tremendous falling off during the fall and winter months. It would appear as if only the physically strong and those with a special quality of perseverance complete the course.

Again, we emphasized that for a properly-equipped citizen, such subjects as civics, history and literature, should be correlated with the more practical work. In the majority of cases the night student does not recognize this fact, and limits his attention entirely to the subjects which he regards as having a direct bearing on his work. This is ultimately a disadvantage to the student as an efficient member of society and tends to strengthen the social barrier between the trades and the professions.

The German schools are day schools with but few exceptions. Where evening attendance is required, the employer must give as many free hours from the day's work as the pupil spends in the evening school. It will, however, be some time before we will have the consent of the manufacturers in Ontario to such arrangement.

While both the day and evening schools have the same aim—the improvement of the industrial worker—yet there is a wide difference in methods. The aim of the day school, as already set forth, is an all-round education with the industries of the locality as a basis from which to draw material. This course would be clearly impossible for the night school pupil. Six months is about as long as a night school can be operated and with an hour and three-quarters or two hours a night, for four nights a week at the most, it would take seven or eight years to cover the work. It is evident, then, that the night school will have to confine its efforts to providing special courses which will give the student just what he wants to further his work in the day. The boy working with an electrician will need a course in the theory of electricity, with the necessary mathematics associated; the boy in the printing establishment will need instruction in the operation of the press, etc., along with a course in composition, spelling and punctuation. In this way the requirements of the different industries of the locality could be met.

In the day school for the manufacturing industries, we confined our courses to work in wood and iron, as it would be clearly impossible to cover all of the field. This would be true to a very much greater extent in the evening school. One part of the Province would require courses which would be entirely out of place in another part. For this reason we will not attempt details of courses in this department.

In connection with domestic science, the elements which constitute our day course might be taken as special courses at night. Food study and preparation would be one course, sewing another, and so on.

The field for night work on the agricultural side is a wide one. During the months from October to March inclusive, the farmers are not so busy, and two or three evenings a week might very profitably be spent in evening school. The practical demonstrations on the school farm and at home would be very limited, owing to the season of the year. The following division might be found feasible for evening work, one or two sections forming a special course:—

PLANT STUDIES—

Cereals; meadows and pastures; legumes; roots and tubers; weeds; insect friends and enemies of plants; plant diseases; fruit studies; forestry.

ANIMAL STUDIES—

Value of animals in agriculture; animal products and their use; animal types and breeds.

FARM BUSINESS AND LIFE—

System of farm accounts and bookkeeping; mapping home farms and showing plans of crop rotation; studies in design for farm buildings; landscape designs for farmstead grounds; farm life conveniences; country life institutions and their improvement.

MACHINE STUDIES—

The common farm machinery; taking down and setting up farm machinery; the gas engine; the proper care of machinery; cement construction on the farm.

SOIL STUDIES—

Origin, types and composition of soil; physical relations of soil to water, air and temperature; soil fertility and permanency; study of yields and farm practices of the neighbourhood.

CONDITIONS OF PLANT GROWTH—

Plant propagation; relation of growing plants to soil, moisture, temperature, light, plant food, and cultivation.

Chapter XII.

ATTENDANCE, SUPPORT AND CONTROL

We have called attention to the great numbers who leave our present schools and enter the various industries; we have pointed out that they have had no training specially adapted to their life work; we have suggested schools and topics for courses, but the question remains to be answered—would these schools have a voluntary attendance sufficient to warrant the expense connected with them? This raises the question of compulsory attendance and the extent to which it should be enforced.

Looking at the problem in its fundamental aspects, we ask—why should the state make anything compulsory? The answer would seem to be—because it makes it easier for the state as a state to exist. The great majority of society recognize that they are the state, and that self-government implies living in accordance with rules which have been found to be in the best interests of society. Force, then, as exercised by the state applies only to the recalcitrant members of society. Occasionally someone rebels against the social order, and in the interests of society at large the state must intervene.

This is true, in the main, with the present system of compulsory education in the public schools. The great majority of people recognize that education is a good thing for their children, and no force is necessary to make them send their children to school. This is due, however, to a very great extent to the social recognition which the public school has acquired. It is an institution of long standing, and has become such a part of the social fabric that few think of opposition.

This is not the case with our new type of school. It has not long years of social recognition. The very fact that some changes are proposed, at once raises that natural feeling of distrust to everything new. Further, and no doubt the most important reason is the old idea of the profession versus the trades, and the social line which some erect between them. For these reasons, we think that some form of compulsory attendance at these schools would be desirable for a time at least.

The most notable example of compulsory attendance at industrial schools is Germany. In nearly all the provinces attendance at the continuation schools is compulsory. Some make fourteen to seventeen the years of compulsion, while others make fourteen

to eighteen the limits. Employers are obliged to permit employees between these ages to attend school a certain number of hours per week without loss of wages. Reports from German educationists show that, while considerable opposition was raised at first, now the employers are strongly in favor of the system.

Regarding the situation in England, no definite action has yet been taken by the educational authorities. The following clauses from the recommendations of the Consultative Committee appointed to look into the question, show that such steps have been contemplated: "It should be lawful for the Educational authority of any County or County Borough to make by-laws (subject to confirmation by the Board of Education) for requiring the attendance at continuation classes, to an age to be fixed by the by-laws, but not exceeding seventeen years, of any young persons residing or working in their district who are not otherwise receiving a suitable education. . . ."

"It should be the statutory duty of every employer of any young person under seventeen years of age (a) to enable him or her to attend continuation classes for such period of time and at such hours as shall be required by the by-laws of the Local Education authority of the district in which such young person either works or resides, and (b) to supply the names of all such persons to the Local Authorities on demand."

In Scotland, authority was given the municipalities in 1908 to enact by-laws requiring attendance at these schools. In only three or four places have by-laws been made.

In the United States the question of compulsory attendance at vocational schools is receiving a great deal of attention. The 1912 report of the Bureau of Education at Washington states that compulsory attendance laws are in operation in Indiana, Ohio, Wisconsin, Connecticut and New York, and that such legislation is being sought in Massachusetts.

The situation in Ontario is no doubt heading in the direction of compulsory attendance. The situation at present is of the nature of Local Option. On the request of ten per cent. of the electors of a municipality, the council may submit a by-law which might have for its object making attendance at industrial schools, compulsory. Under this by-law, the parent or guardian would be required to see that the adolescent attends the classes provided for him. Also, the employer would be obliged to give notice to the Board of the names of the adolescents in his employment and the hours which they work for him. He is also required to release the adolescent for the number of hours during which he may be required to attend the school provided.

No municipalities have as yet taken advantage of this law, and it would appear as if the government would have to enact laws for compulsory attendance which would apply, at least, to urban localities. All will admit that this form of education is a pressing need; other countries are getting good results from compulsory attendance—then why not class it as one of the necessities for the advancement of the state? The government could enact a general law that all boys living in places of over two thousand population must attend the supplementary school for the period of two years following the public school, unless in attendance at a recognized high or continuation school. Lists of attendance at both schools could be furnished the truant officer, who could look after cases of delinquency. Provision would have to be made in the case where children had to go to work to help support the home. Exemption from attendance might be granted these on certificate of the mayor or magistrate, all such cases to be investigated by the truant officer. A law compelling the employer to allow this class of worker a certain number of hours per week to attend school, would be beneficial to the boy, but would no doubt lead to discrimination against this class of worker. The co-operative schools of Chapter IX. would be one way of treating this phase of the question.

This would virtually mean making all schools compulsory for two years following the public school, but such a step would be in the interests of society. In making this education compulsory we would be obliged to provide training in what the boy wants for later life; otherwise, it would be unwise to compel him to attend.

Regarding the agricultural schools, the need of compulsory attendance no doubt exists. In the great majority of cases, however, there would be a considerable distance between these schools, and to say that all boys from the farm must attend, regardless of roads or weather, would be out of the question. One clause of the Act in Scotland places a limit of two miles for compulsory attendance at the continuation schools. Something of this kind might be workable here, the distance in each case being determined by local conditions. The consolidated school movement would, if put into effect, do much to solve this question.

With respect to the girls' school, attendance might at least be made compulsory in urban centres. Limited courses in domestic science are now given in some of the high schools. This would in some measure meet the needs of the girl who wishes to go on to a university. Only a small percentage of girls, however, go on to the university; for the others, our supplementary school

would provide the most suitable preparation. Our course should be sufficiently rich on the aesthetic side to meet the demands of those parents who had contemplated a general high school education for their daughter, at the same time giving a thorough training in home-making. Special cases where their services were absolutely essential at home could be dealt with as suggested in connection with the boys' school. In the rural districts, so many difficulties loom up that we are afraid that compulsory attendance would not work. The distance from school, the need of their help at home, etc., would make the system seem a hardship. This part could afford to wait until a strong public sentiment was built up around the whole question of vocational training.

The matter of financing these schools is one of its greatest difficulties. The necessary equipment to make the work effective in any degree, will of necessity be expensive. The particular district served by the school should not have to bear the whole burden, as the benefits from such a school are not confined to any particular locality. If more capable artisans have been produced; if the horizon of citizenship has been extended for the worker, surely these influences will spread beyond the confines of any town or city. The improved class of goods will go to all parts of the Dominion, and the higher ideals of manhood will reflect themselves in the type of legislators and in all forms of administration. The government spends annually large sums in building drill halls and equipment for the militia, but pays practically no attention to the creation of a peace army for the maintenance of industrial supremacy. We think, then, that if the school district was assessed for, say, sixty per cent. of the cost, the remainder should be divided equally between the provincial and federal governments. We presume that the present method of dividing the grant from the local parliament is proving satisfactory. Some scheme could also be worked out for the federal grant which would bolster up the weak places in the system.

Regarding management, the present Advisory Committee should work to advantage. It is composed of twelve members, six of whom are members of the Board of Education. Of the others, three must be employers of labour and three employees.

Chapter XIII.

A HIGHER TECHNICAL SCHOOL

In our chapter on the "Automatic Worker" we dealt with our first division of the field—workers of the hand. In several chapters following that, we proposed courses which were intended to meet the needs of those in our second class—workers of the hand and head. We will now propose a higher school for our third class—workers of the head.

With respect to agriculture and home-making, more advanced work is provided for both at the Agricultural College, Guelph, and for the latter at the Lillian Massey School, Toronto. These would meet the needs of those desiring to continue the work beyond that suggested in our supplementary schools. For the manufacturing industry, however, more advanced work might be provided in a number of cities. This could take the form of a two-years' course to follow that outlined for our more elementary school. This course could be used to give more advanced training to the artisan, and would specially meet the needs of coming managers, foremen, and leaders in industrial enterprises.

The cities in which a four-years' course might profitably be established will no doubt increase if the industrial growth of the last decade be maintained. Special courses might be developed beyond the second-year stage in many places comparatively small, where special conditions warrant such a procedure. For the full four-years' course, possibly Toronto, Ottawa, Hamilton and London would be the only places feasible at present.

This four-year school will be most valuable from another standpoint. Each year sees increasing numbers entering the Applied Science Faculties of our Universities. This school should be the best place to prepare candidates for these faculties. The courses in drawing, which are not given at all in the ordinary high school; the greater attention to the science subjects, and the practical tendency of all work, make this type of school the proper training ground for science students. Wherever, then, this four-year school is in operation, the Department of Education should make it obligatory for candidates for applied science to take the work there. This would constitute a separate department of the work, the course for which is laid down in the university regulations.

As a continuance of the work of our supplementary school, we will now suggest general headings for courses in the following:—
 (1) Architecture and building construction; (2) the making of furniture; (3) pattern making and foundry work; (4) machine shop and forge; (5) steam and gas engineering; (6) electricity; (7) art. We will first give the more general subjects which will form part of nearly all the courses, and follow this by the special courses.*

CIVICS—

Third Year:—The following topics would afford material—
 sanitary legislation; life insurance; old age pension; labor and benevolent organizations; trusts; the social and economical structure of the community; rights and duties of citizens of the state; the organization of the community in a general sense; the participation of citizens in promoting the common interests of life.

COMPOSITION—

Third Year:—(Written Work)—Articles on technical subjects; reports to the department of labor; communications to Boards of Trade; essays on subjects dealt with in civics; special attention to diction, clearness and conciseness.

(Oral Work)—Subjects dealing with relation of different elements of the building trade, with laying out and planning of different shops, with modern scientific apparatus and their relation to industry.

Fourth Year:—A continuance of the work of the third year. The oral might be extended to include debates on the social and political questions of the day and on topics which would be suggested by the civics of the previous year.

LITERATURE—

Third Year:—*Tennyson*—*Passing of Arthur*; *Enone*; *Ulysses*.

Wordsworth—*The Green Linnet*; *Education of Nature*; *To the Cockoo*.

Longfellow—*The Day is Done*; *The Old Clock on the Stairs*.

*We again state, as in the courses for our earlier school, that we received assistance from a number of the teachers at the Toronto Technical School, as well as from the calendars of similar schools in other countries.

Shakespeare—Macbeth.

Macaulay—Lord Clive.

Memorization of choice passages in the above.

Fourth Year:—*Tennyson*—Saint Agnes' Eve; Break, Break, Break; Elaine.

Browning—Hervé Riel; My Last Duchess; Up at a Villa—Down in the City; Andrea Del Sarto.

Wordsworth—Ode to Duty; Ode on Intimations of Immortality; Milton; London.

Longfellow—The Hanging of the Crane; Resignation; The Warden of the Cinque Port.

Ruskin—Selections from Stones of Venice.

Huxley—Laws of Nature.

Burke—Best method of dealing with the Americans.

Charlotte Bronte—The Forbidding of the Marriage.

Biographical sketches of some of the more important of the preceding authors.

MATHEMATICS—

Third Year:—**Mensuration**:—A review of the principles of the second year, with the solution of more difficult problems; the ellipse; zones and segments of spheres; ellipsoid; paraboloid; prismoid; the application of logarithms to the solution of all problems; short methods of computing by means of the slide rule, tables, etc.; percentage errors and the checking of results; use of planimeter.

Geometry:—A review of the work of the second year with a solution of more difficult deductions; the circle; ratio and proportion; similar figures; practical applications in mensuration and surveying.

Algebra:—A review of the principles of the earlier years; a more detailed study of the quadratic with extensive practice in problems in mechanics and statics; surds; indices; approximations; graphs; plotting of laws of machines, laws of pressure, temperature; maxima and minima.

Trigonometry:—More difficult problems on work of second year; solution of oblique angled triangles; the circumscribed, inscribed and escribed circles; use of such instruments as the surveyor's compass, transit, level, chain; problems arising out of the data obtained with these instruments; plotting of sine, cosine and tangent curves.

Fourth Year:—**Algebra**:—Ratio and proportion; variation; binomial theorem for positive integer; rationalization; graphs continued.

Geometry (Solid):—A study of the general properties of plane rectilinear figures; lines in space; planes; polyhedra; cylinders; cones; the sphere; similar solids; the construction of regular solids; applications of the principles of solid geometry to a large number of problems.

Work in mathematical laboratory could be carried on throughout the entire course in mathematics. The various areas and solids met with in mensuration could be measured, experiments in moments and levers could be performed, the value of π could be obtained, the use of measuring rods, the balance, micrometer screw, gauge, etc., could be taught.

MECHANICS AND STRENGTH OF MATERIALS—

Third Year:—**"Forces"** (continued):—Use of polygon of forces in graphical determination of stresses, in more difficult roof trusses and in cranes; parallel forces, and division of loads on posts and abutments; centre of gravity. Work; energy; impact; velocity ratio of gears; mechanical advantage and efficiency of pulleys and blocks. Beams and girders; bending moments and shearing forces applied to determination of safe carrying capacity of beams and girders; live and dead loads compared as to effect on stress in members of trusses.

Study of Instruments:—Use of vernier, scales, callipers, micrometer gauges, in determination of stress, strain, modulus of elasticity, ultimate strength of wires and rods of different diameters and materials, percentage elongation at fracture; properties of materials used by mechanics.

Riveted Joints:—Lap and butt joints; size of rivets and spacing; efficiency of joints; strength of boiler shells and tubes calculated.

Fourth Year:—**Transmission of Power by Shafts and Belting**: Strength of shafts and power transmitted by hollow and solid shafts; calculation of width and thickness of belts for transmitting given horse-power; worm gears.

Centrifugal and Centripetal Forces:—More difficult problems in connection with force, mass, time, and acceleration; centrifugal and centripetal forces; use of fly wheel; strength of fly wheels; unbalanced fly wheels and effect on bearing friction; study of motion of projectiles.

Design of columns, posts, etc., and "given formulae" only: Factors of safety for different materials and for different conditions; discussion on and design of reinforced concrete structures and foundations.

Effect of pressure on walls and roofs, and the effect on design of roof trusses, etc.

Elementary study of flow of water in pipes.

Friction:—Study of friction in bearings; on inclined planes (continued); coefficient of friction under different methods of lubrication; limiting angle of friction; design of bearings for minimum heating effects and wear.

Third and Fourth Years:—**Laboratory Work:**—Use of apparatus to illustrate simple trusses and cranes, and measurement of stresses directly; same stresses calculated graphically and by trigonometrical ratios; test of pulleys and block and tackle for efficiency; use of instruments—vernier, callipers, micrometer gauges, planimeters and apparatus for determination of elastic limit, elongation and ultimate strength of wires, and effect on the above of heating and cooling quickly and slowly; study of friction losses, by actual experiment, and the effect on the same of lubrication; crushing strength of samples of brick, rock, concrete; deflection of reinforced concrete beams and steel beams for different loads; testing test bars of cast and wrought iron and steel for use in beams and angle irons and boiler plates; mixing different proportions of sand, stone and cement and testing for crushing and tensile strength after different periods of time for setting; testing of pure cement for deficiency or excess of constituents by practical tests in strength of materials laboratory.

Architecture and Building Construction—

Third and Fourth Years:—**Shop Work:**—Construction of the section of a wall; the construction of models of a roof; the construction of a small-sized staircase. To this might be added a limited amount of other work in brick and concrete, and if tools were available some illustrations of gas fitting, electrical wiring, and plumbing might be taken up in connection with the construction of wall above.

Mechanical Drawing:—Plans, elevations and sections of simple structures in frame, brick and stone; the details of building construction of the structures so drawn—framing, roof and cornice details, windows, doors, door frames,

foundations, concrete, masonry, brick work, elements of sanitation and plumbing details, electrical details; architectural design and composition; the classic orders and their applications; specifications, contracts, superintendence. For those who follow the architectural side it would be necessary to give broader attention to the various details and more particular attention to the classic orders, their applications, and details of advanced design. On the other hand, the architect would require less attention to the shop work than the builder.

Freehand Drawing (more especially for the architect): Historic ornament; mouldings; sketching of architectural orders; sketching from nature, landscapes, etc.; drawing from cast of architectural ornament; rendering in different media, such as pencil, charcoal, pen and ink, and water-color.

Perspective (for the architect):—General principles of perspective; problems in parallel, angular and architectural perspective of both exteriors and interiors of structures designed in the architectural drawing classes; rendering of these perspective in different media.

Estimating:—Taking off quantities for the various trades from blue prints and specifications; formation of these quantities into schedules; methods of pricing material and labour for the various trades; completion of accurate estimates and common methods of securing rapid approximates.

Clay Modelling (for the architect):—Simple studies in surface modulation; ornamentation; modelling of designs of architectural and classic ornament; figure work; making of moulds and castings.

Chemistry:—First Year—As given in earlier course. Second Year—Additional study of silicon and its compounds, and of the alkali and alkali earth metals. Third Year—Preparation and composition of lime, plaster, cement and concrete, with their uses; setting of mortar and hardening of concrete bricks; composition, description and derivation of the various stones used in building.

In conjunction with the above, the student would take the work of the third and fourth years in mechanics, strength of materials, mathematics, civics and English.

THE MAKING OF FURNITURE—

Third and Fourth Years:—**Shop Work:**—Joints used in furniture making, such as, through and stub, mortise and tenon, dowel pins, dove tails, matched joints; use of invisible fastenings; veneering; inlaid work; laying out furniture; period styles.

Mechanical Drawing:—Details of joinery and carpentry; various classes of joints and their special advantages; design of furniture and interior fittings; classic periods, characteristics and application to design.

Freehand:—Historic ornament; mouldings; sketching of architectural orders; preparation of decorative designs; preparation of working drawings from scale designs; the period styles; rendering in different media.

Perspective:—A course similar to that outlined for the architect, with special adaptation to furniture and interior fittings.

Along with the above, the student could take the work of the third and fourth years in mechanics, strength of materials, English, civics and mathematics.

Pattern Making and Foundry Work—

Third and Fourth Years:—**Pattern Making:**—Instruction and practice in the making of patterns for iron and brass castings; allowance for draft, shrinkage, finish, etc.; use and making of core boxes; wood turning as applied to pattern making; more advanced work, including loose parts attached by pins and dove tails; more difficult core work built up with segments and staves, and work built on fallow boards.

Foundry Work:—Foundry work in brass and white metal or in iron, if a cupola forms part of the equipment; ramming the mould; beating; use of parting sand and of moulders' facings; use of slick; cutting gates and sprues; making, baking, and placing cores, clamping the flasks securely, pouring the moulds; charging and tapping the cupola; study of the best mixtures for various castings; the use of fluxes; melting brass in crucibles and the care of the crucibles; cleaning of castings.

Mechanical Drawing:—Mechanical motions; their applications; cams; valve motions; gearing; proportioning

of structures and machine parts; problems in machine design, in electrical construction and design, or in steam and gas engine design. The student to stress the one meeting his special requirements.

Chemistry:—Metallurgy and properties of the various metals of industrial importance; composition and properties of common alloys; composition and properties of wrought iron, cast iron, and various steels; hardening, tempering and annealing.

Along with the above the student would take the work of the third and fourth years in mechanics, strength of materials, mathematics, civics and English.

Machine Shop and Forge Work—

Third and Fourth Years:—**Machine Shop Practice:**—A review of the work of the second year; more advanced lathe work; making of small tools—reamers, mandrels, taps and dies, milling cutters—for use in the shop; work on planer, shaper, drill press, milling machine and universal grinder.

Forge Work:—Instruction in the mechanism and care of the forge; operation and handling of fire; heating; drawing; bending; upsetting; heading; welding; punching; riveting, drilling. Work in tool steel, such as the making hardening and tempering of punches, scribers, chisels of all kinds, lath tools and tools used in the forge shop.

In connection with the above, the student would take the work of the third and fourth years in mechanical drawing (as outlined under Pattern Making and Foundry Work), chemistry (as outlined under Pattern Making and Foundry Work), mechanics, strength of materials, mathematics, civics and English.

Steam and Gas Engineering—

Third and Fourth Years:—A review of the principles of heat as referred to under the Physics of the Supplementary School.

Steam and Other Vapors:—Formation of steam; saturated steam; pressure and volume; heat of the liquid; latent heat; total heat; quality of steam; steam calorimeters; actual and equivalent evaporation; superheated steam; properties of ammonia; gasoline vapor.

Practical Applications:—Indicated horse-power; brake horse-power; engine efficiency; heating of buildings.

Boiler Calculations:—Heating surface; grate surface; boiler horse-power; strength of shell; stays; riveted joints; strength of flues; draft; economizers; superheaters; safety valves.

Fuels and Firing:—Classification of fuels; heating values of fuels; combustion; air required; flue gas analysis; rules for firing; causes of smoke; smoke prevention; mechanical stokers.

Operation and Management:—Cutting in boilers; firing; banking fires; foaming; blowing out; feed water heating; cleaning; low water, forced and induced draft; feed water treatment.

Principles of the Steam Engine:—Different types; steam engine mechanism; types of parts; indicators and indicator cards; reducing motions; study of cards; indicated and brake horse-power.

Action of Steam in the Cylinder:—Non-expansive use of steam; using steam expansively; governors and link motions.

Steam Engine Economics:—Steam jackets; compounding; triple and quadruple expansion; receivers; reheaters; quality of steam; superheat; steam engine efficiencies.

Steam Engine Accessories and Settings:—Separators; lubricators; oiling systems; steam traps; condensers.

Explanation of Cycles:—Nature of an explosion; the four-stroke cycle; the gas engine mechanism; cooling; ignition; clearance and compression; piston displacement; the two-stroke cycle; two and three part types; comparison of types.

Oil Engines:—Principles of vaporization; types of oil engines; properties of oil fuels.

Engine Accessories:—Carburettors; properties of gasoline; mixing valves; auxiliary air valves; mixture troubles; methods of governing; types of governors; make and brake igniters; jump spark ignition; batteries and magnetos.

Engine Operation:—Ignition troubles; mixture troubles; lubrication; valve setting; study of indicator diagrams; starting devices.

In connection with this course the student could take the machine shop practice of the second year, the mechanical drawing of the third and fourth year referred to under the course in pattern making and foundry work, the mechanics and strength of materials of the third and fourth years, the mathematics and English of the third and fourth year, and the following chemistry: Elementary chemistry of the first year; review of oxidation and combustion; consideration of the various fuels used in engines; calculation of mixtures for gas engines to give the greatest explosive force; proper methods of firing; calorimetry.

Electricity—

Third Year:—Electricity Studied from its Effects:—(1) heating; (2) magnetic; (3) electro-chemical; Ohm's law continued; determination of resistance, current, and voltage drop in feeders, transmission lines, etc.; calculation of power loss in circuits; two and three wire distribution compared.

The Magnetic Circuit:—Reluctance, permeability, magneto motive force; electro-magnetism and electro-magnetic induction; induction coils and theory of induction machines; dynamo as motor or generator, series, shunt and compound.

Electrical Instruments (continued):—Construction of ammeter, galvanometers; voltmeters, recording and indicating Watt meters, uses of these in circuits; use of Wheatstone bridge.

Study of Troubles in Generators and Motors:—Tests for crosses, grounds, and open circuits in lines; testing of generators and motors for efficiency; speed regulation, torque and counter E.M.F.

Fourth Year:—(a) Study of armature windings; photometric tests of incandescent and arc lamps for candle power and efficiency; further tests of dynamos for efficiency (separation of losses), for characteristics; calibration of meters; use of permeameter in testing for quality of iron.

(b) Alternating currents—simple harmonic electromotive forces and currents; their phase relations; calculation of inductance, reactance, and impedance of alternating current circuits including choke coils; power in single, two and three-phase circuits; theory of induction motor, synchronous motor, and rotary converters; study of static transformers for efficiency and polarity; simple design of transformers: Delta and Star connections.

Special Short Courses:—1. Electric railways. 2. Wave analysis. 3. Design of special apparatus. 4. Telephone and telegraph circuits and switchboards. 5. Illumination by electricity. 6. Wireless telegraphy.

In connection with the above the student could take the mechanical drawing referred to under the course in pattern making and foundry work, and the mathematics, civics and English of the third and fourth years.

We referred to the importance of Art in industrial education in Chapter VI., but did not suggest a separate art course for the supplementary school. We thought that such a course would scarcely be feasible in every town of over two thousand inhabitants, and consequently reserved the course for the present chapter. An art course would undoubtedly be feasible in cities where a four-year school could be established. The following is a two-year course.

The course in art is intended to give a sound and systematic training in the laws and principles of drawing, painting, modelling and design, as a means of hand and eye training and with a view of definite application to art industry.

This course will provide the necessary elementary instruction enabling students to train for art teachers; also the preparation of designers and craftsmen for our art industries, such as engraving, lithographing, publishing, illustrating, advertising, decorating and modelling.

The course is primarily an educative one, but also one in which students may find the necessary groundwork for their trade or profession in art.

First Year:—Freehand Drawing:—In outline, mass, or light and shade from models, casts, or blackboard demonstrations; memory drawing, the application of solid models to objects of use; drawing of flowers, leaves, animals, etc.; the conventionalization of same with a view to elementary design.

Mechanical Drawing:—The use of instruments; geometrical constructions; their meaning and application to design; orthographic projections; intersection and development of surfaces; dimensioning and drawing to scale of objects, such as tables, doors, chairs, etc.

Lettering:—The origin of lettering; examples of the use of lettering to be selected from famous works of art, viz.: sculpture, illuminated MSS., etc.; drawing of various forms

by freehand, brush and instruments; type for study, Block, Roman, Old English; the practical use of the letter in the formation of good printing, advertisement, sentences and titles.

Color Work:—Lectures and experiments dealing with the physical aspect of color, followed by demonstrations by the instructor on its use; the meaning of monochrome and polychrome, harmony and contrast; mixing of colors by students to illustrate same; the difference between the use of color in nature and design; laws governing the use of colors; painting in water colors of plants; conventionalization of same.

History of Art:—Lectures illustrated with lantern views, also blackboard demonstrations with colored chalk of the following periods of art: (a) Prehistoric, Egyptian, Chaldeane and Persian, (b) Greek and Roman; special reference to the development of ornament in relation to its decorative purpose, e.g., architecture, sculpture, painting, pottery; exercises by students in color and black and white.

Elementary Design:—The study of elementary principles of ornament and composition in design; the evolution of pattern beginning with straight line; special reference to historic examples; the growth of pattern work—(1) through the use of geometry, (2) the use of natural forms, (3) the use of conventional forms; simple pictorial composition illustrating fairy tales, incidents in work and play, etc.

Clay Modelling:—Demonstrations showing the elementary principles of modelling; the development of planes and surfaces; students to begin with the modelling of leaves, fruit, simple mouldings; the use of same in design; simple pottery; making of shapes by moulding; casting.

Second Year:—Freehand Drawing:—Light and shade from casts, groups of objects, draperies, etc.; drawing in outline of same; drawing the interior of school rooms and exteriors seen from school window; studies from nature to be very carefully made from flowers, foliage, butterflies, shells, wings, and from photographs; structure to be specially observed and refinement of drawing aimed at; conventionalization.

Mechanical Drawing:—First year continued, with a view to application of geometrical and ornamental design;

examples of historic ornament as well as current examples should be consulted; the construction of mosaics and floors as in Roman work, linoleums, parquetry, ornamental brick and tile work, Gothic window tracery, ceilings, paneling for rooms, architectural mouldings, etc.

Lettering:—First year continued and advanced; the use of the reed and quill pen; the acquiring of a formal hand (founded on early writing); the practical application of lettering, i.e., spacing and arrangement in addresses, books, and other MSS., and in bill heads, book plates, black and white work, title pages, book decoration and other printed matter.

Color Work:—The study of color; color combinations; development of color sense; brush work in symmetrical patterns, making the most of characteristic strokes of the brush, translating natural forms into free brush work and arranging them to fill given spaces.

History of Art:—First year continued; tracing the evolution of ornament from the earlier periods to the following: (a) Early Italian, (b) Gothic, (c) Renaissance; studies of the lives and works of great artists of the above periods; practical exercises in color and black and white by students.

Blackboard Drawing:—Drawing and illustration with white chalk and colored crayons in outline and mass; students to demonstrate before the class.

Industrial Design:—Making use of nature studies as means of designing; conditions of pattern design; copying fine examples; subjects—(1) designing for decoration, stained glass, tapestry, wall papers, stencils; (2) pottery and porcelain; (3) embroidery, lace, carpets, damasks; (4) the book and its decoration, illustration, borders, initials, title page, etc.

Clay Modelling:—Modelling the details of the face, example—Michael Angelo's "David"; the antique bust, both in the round and relief; animal studies; principles of anatomy; the use of the figure and ornament in design and decoration, with simple exercises; making of pottery; coloring and brazing plaster casts; moulding in plaster, wax and gelatine.

In connection with the above course, the student would take the arithmetic, civics and English of the first two years of the supplementary school.

Chapter XIV

THE QUESTION OF TEACHERS

No matter how much attention we pay to courses of study, and organization of schools, they will be all of little avail if we cannot provide a competent staff of teachers. To exercise police force as previously suggested, and yet not have teachers qualified to handle the schools properly, would eventually defeat itself. However, an immediate solution of the problem presents many difficulties.

There are two kinds of teachers. There is the academic man who has gone through the high school and the university and has been brought up on theory and theory only. As regards the application of this theory to the operations of the shop, he knows but little. The ordinary mechanic asks him some question from his daily experience and the phraseology of the shop confuses him. The other is the shop man who has made a success of the particular trade in which he has been engaged and who attempts to teach the boy these operations. At the end of about the third day we fancy hearing him say—"I have shown the boy all I know about the use of tools, what shall I do now?" He has no idea of such a thing as a logical development of his subject and the correlation that springs up at every turn. One knows only the intellectual forms of education, but knows nothing of the shop practice. The other knows how to do a thing with his hands, but knows nothing of the sciences that are necessary to make the thing an intelligent process and to set the student thinking out a reason for each operation.

Neither of these teachers would be ideal for our schools. One would develop the theoretical side only, while the other would turn our school into a trade school, which is one of the very things we would avoid. Both need training. The academic teacher needs training in the practice of the trades; the shop man needs training in the principles of teaching.

The question naturally comes to our mind, what might be regarded as the essentials of a good teacher for this type of school?

He should be familiar with the subject or subjects he intends to teach from the standpoint of the trade; he should be familiar with the principles of teaching; he must have some ability to

deal sympathetically and intelligently with both adults and adolescents; he should be reasonably familiar with his department as a unit in the broad field of industry—consequently, should be a student of industrial movements and know something of their relation to other problems of the day.

We might take a glance at what is being done in other countries in this connection. Germany has the oldest and possibly the most comprehensive scheme. The recent movement in Germany for the emancipation of women has resulted in considerable attention being paid to the training of women teachers for schools of domestic art and home-making. Speaking generally, the training consists of three stages—theoretical instruction in the training school; practical instruction in the industry; and probationary teaching. Admission into the training school requires not only passing of an examination as teacher of household arts and women's handiwork, but also that preparation be made in a Women's Institute approved by the Ministry of Commerce and Industry. The school conducted by the *Lette Verein* is permitted to prepare teachers for everything except drawing. The *Pestaiozzi-Froebel House* trains for cookery and household arts. The *Victoria School* in Berlin trains teachers for dressmaking and millinery. The three State institutions at Posen, Rheydt and Potsdam all undertake the training of teachers for women's work, each school having four divisions.

The training of teachers for boys' schools has been developed to a greater or less degree in the different provinces. The following extract from a letter from Dr. Kerschensteiner, of Munich, might give some idea of the care that is taken in the preparation of teachers: "The training of trade teachers in Germany goes on, properly speaking, in only two towns—Karlsruhe and Munich. In the rest of Germany, trade teachers are mainly chosen from the certified students of the different technical day schools. In regard to Munich, the town in which trade teachers are more employed in continuation schools than in all the rest of Germany and Austria, we train our teachers ourselves. Every year, when need arises, we issue a notice that first-class men engaged in the trades are wanted for the different branches of wood work and metal work. The applicants must stand an examination, which includes the execution of a piece of practical work, the drawing of the plans of that work, an estimate of the expense involved and a written description of the steps involved. The candidate must next practice for six months without pay, in the workshops provided for that purpose. In the second half-year he must continue his practice, while receiving part pay. In the meantime, he must also attend a series of lectures on the theory of education, on

technology, and on machine and tool construction. At the end of the year he has another examination to pass."

Great care is also taken in training teachers for the agricultural industry in Germany. The two best-known pedagogical seminaries for the work are the ones at Hildesheim and Weilburg. In order to qualify for teaching, even in the elementary agricultural schools, the candidate must have general education equivalent to that required for one year military service; four years of practical work in agriculture under proper supervision; three years' course in agriculture in a university or technical high school; successful completion of a professional course in a normal school.

In England there are no special institutions for training teachers for the industrial and technical classes. The technical institutions themselves and the departments of applied science in colleges provide instruction for those who may occupy positions in the schools of the higher grades. For the evening classes, the teacher usually comes from the ranks of those who have had some technical training as well as experience in the workshop or drafting offices.

There are a number of agricultural colleges in England which have recently been recognized as departments of a university. The courses there offered, together with a rather extensive scheme of summer schools, are the means used for preparing agricultural teachers.

In Scotland, the teachers for the continuation schools are usually teachers from the ordinary public schools who have taken some short courses or other special preparation for industrial work.

The need of trained teachers for vocational schools is a very prominent question in the United States at present. The National Society for the Promotion of Industrial Education has devoted much attention to the subject. Not a great deal has yet been done along the line of establishing separate training schools for this type of teacher. Among the best-known at present are the departments in connection with the Stout Institute at Menominee; the Teachers' College, Columbia University; the Teachers' Training Department in connection with the Pratt Institute, New York, and the State Normal School, at Fitchburg, Mass. The three first-mentioned institutions have departments for training teachers in domestic science. Of the Fitchburg institution, the calendar states—"In the first year four afternoons a week are devoted to various form of industrial work and to the directing of small

groups of pupils. In this first year the attention is devoted to mechanical drawing, the writing of specifications, estimating costs, study of the common applications of power to industrial work, psychology, child study, pedagogy and the history of education. In the second year practice in teaching is the chief work."

There are fifty colleges of agriculture in the United States, not including the separate institutions for colored students. Twelve of these are offering no special courses for students preparing to teach. The others devote more or less attention to this work.

Considerable attention has been paid in Ontario to the training of teachers for agricultural work. The Agricultural College at Guelph has been referred to in our résumé. From Easter until the end of June it maintains courses for teachers in elementary agriculture and horticulture and in the elementary industrial arts. It also conducts summer classes for teachers in nature study, elementary agriculture, art, constructive work, wood work, metal work, mechanical drawing, and household science. Recent legislation has endeavored to improve the qualification of the teacher of agriculture. Prior to the regulation of August, 1912, the county representative of the Department of Agriculture was expected to teach agriculture in the high and continuation schools. Now the University of Toronto has established a new degree—Bachelor of Science in Agriculture. The first two years of this course are to be taken at the University and the last two at the Agricultural College. The Department of Education will accept this degree as the academic qualification for a specialist's certificate in both science and agriculture and for a public school inspector's certificate. Scholarships are given, and every inducement offered to encourage students to take the course. This should provide an adequate supply of teachers for our agricultural schools.

For teachers of domestic science, there is a department of home economics in the Agricultural College at Guelph, where teachers for our public schools are trained in home science. The Household Science Department of the University of Toronto also grants a teacher's diploma at the expiration of a four-years' course.

With respect to some scheme for preparing teachers for supplementary schools connected with the trades, we think our system of schools would help to some extent after being in operation for a few years. For the present a system of evening schools for both the academic man and the artisan would help to improve the situation. Writers on the subject discuss at great length the

question of which side we will get our industrial teacher from, and many are of the opinion that it must be from the shop. In connection with English, civics, mathematics, physics, chemistry and drawing, we fail to see how a teacher could become qualified, under present conditions, without a course in some so-called academic institution. All these subjects, with the possible exception of some branches of chemistry, are merely correlatives of the trade. If evening courses were established, whereby the teachers of the above subjects could come in actual contact with shop conditions, there seems no reason why they could not become capable teachers. Foremen from the shops might be engaged to discuss these subjects from the shop standpoint. Mathematics as met with in the shop and the terms used, could be taken up with the mathematical teacher; experts in the problem of labor and industry could help the teacher of civics; draftsmen actually engaged in the shops could help the teacher in drawing, and so on. This could be supplemented by personal investigation on the part of the teacher, especially in a study of the needs of the pupils in the various trades. Summer courses, where the teachers would do some actual work in the shop, would also be a great benefit in many of the above subjects.

As to teachers for the various departments of shop-work, these must no doubt be taken from men actually engaged in the shops. Undoubtedly this type of instructor needs some training before making a successful teacher. This point is well emphasized by the training given in Germany. A school manned entirely by shop men would be about as big a farce as we could well imagine. The pupil, in our junior school at least, has not yet learned the lesson of self-control, and the principles of teaching and discipline are very vital at this stage.

To meet this difficulty an evening course could be given to shop men who are being considered for teachers, which would deal with the sort of problems which the teacher of an industrial school has to meet. The principles of good teaching could be applied to the various problems of the shop. For example, the man from the machine shop could be directed to the problem of giving progressive experience on objects of a commercial type. The relation of such questions as drawing to shop mathematics could be similarly discussed. To give some breadth of vision with regard to education, the following topics might be worthy of development:—The relation of education to the state; the various educational ideals, both in the past and at present; the growth of industrial education and its present status in other countries; the laws pertaining to industries in our own country and a comparison with other countries; the social status of the worker here and in other coun-

tries; the elements of psychology; a study of the lives and methods of noted educators; the place of women in the industries; the influence of the increasing use of machinery on the kind of worker and on the kind of work turned out.

With regard to a more permanent supply of teachers, the following should turn out fairly good men. We suggested that all candidates for Faculties of Applied Science in our Universities should take the work in our Supplementary and Higher Technical School where at all possible. After this student has graduated in applied science from the University, he should take a teachers' training course, which would have a distinct industrial trend. This could be made a part of the present course in the Faculty of Education, Toronto University, and the practice work could be done in the Technical Schools of Toronto. For those who are to teach the shop subjects, additional time should be spent in actual work in the factory.



Chapter XV.

SOME HINDRANCES TO THE MOVEMENT

The whole upward movement of society has been in the direction of acquiring freedom. The consolidation of the various social groups into a national unit was necessary to prevent defeat. The result was national freedom. Following this came the struggle for individual freedom. Throughout the middle ages and down to the middle of the nineteenth century the great fight was against feudalism, serfdom, slavery, and despotism. Having obtained political freedom, the next step was social freedom. We are to-day in the midst of this great struggle for social emancipation, and one of the most potent influences in this direction is the "universal education" which we have advocated in this paper.

Great as is the importance of this movement, yet there are many hindrances to its advancement. We have referred to the attitude of many manufacturers who openly oppose any form of education for their employees, for fear it will raise their wage bill. Then there is a large number of indifferent employers, who say—"I am getting fair results, leave well enough alone." Both these classes are undoubtedly real hindrances to the movement, and the necessity of convincing them of the value of training marks the next line of advance.

Another difficulty arises from the fact that leaders in this movement, having become saturated with the experience of foreign countries, are inclined to try to force this foreign practice upon our schools without sufficient evidence that it is suited to our special conditions. This has in some cases resulted in failure, and has given a temporary setback to the movement.

Another great obstacle is the attitude of the learned professions. It has been considered fashionable to speak of the courses in arts and medicine as general and liberal as opposed to technical. We feel confident that an examination of the facts will discover that the students taking these courses in our colleges are taking them in preparation for a definite career, and consequently we see no reason why the courses in arts and medicine should not be called vocational just the same as those in plumbing and carpentry.

Those who talk the most about this commercializing of education are teachers in schools of the conventional type. One would hardly expect that such criticism would come from this

quarter, but that is the case. We would like to ask, do not these teachers earn their money like mechanics? By what rule do we judge carpentry is a trade and teaching a profession? That masonry is industrial and journalism liberal? The truth is they are all vocational; they provide means whereby men and women pay their bills, and 99 per cent. of those in all these fields are taking them because they provide a congenial field of activity whereby the individual may become a self-supporting member of society. These devotees of the theoretical would have us, like Plato, live in the realm of the ideal, and regard the actual, for which these ideas stand, as a clog to the aspirations of the soul. Fill the mind with ideas, they say, but do not connect with the actual conditions of life or you have a menial "bread and butter" education. Fortunately, this "idol of the cave" is being banished, and educationists everywhere are beginning to recognize that we must learn to know by doing. They are being forced to see that a complete training for the activities of life is the dominant note in education to-day; like Banquo's ghost, it will not down.

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